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Europe Report

SCIENCE AND TECHNOLOGY

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EUROPE REPORT

SCIENCE AND TECHNOLOGY

WEST EUROPE

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WEST EUROPE/BIOTECHNOLOGY

BIOLOGICAL CLEANUP OF OIL SPILLS SAFE, ECONOMICAL IN FRG

Hamburg DIE ZEIT in German 4 Apr 86 p 28

[Article by Wolfgang Gehrmann: "Bacteria Are Better Than Dredgers, The Biological Clean-up Of Oil-Contaminated Ground May Develop Into A Million-Mark Business"]

[Text] The vein of gold lies neither in the Klondyke nor on the Sacramento. It is found at an everyday gas station in the Schmargendorf district in the city of Berlin. When Dieter Debus speaks of what is to be found ten meters below the ground there, he sometimes chooses words that conjure up images of legendary treasures, gold diggers, adventure and sudden wealth: "Gold. Gold is buried everywhere."

Not really. To be truthful, the mineral in question here is anything but coveted. The ground underneath the gas pumps contains ten tons of dirty diesel oil that has leaked from a rusted out tank. It is a sinister problem, for the oil is threatening to contaminate the ground water. Dieter Debus wants to get rid of the mess. Since Debus believes he knows how the environmental threat can be averted unproblematically, he may turn the clumps of oil underneath the gas station into a goldmine for himself.

Debus, a biochemist, wants to get rid of the oil by letting bacteria eat it away. The organisms would be introduced into the ground below the gas station through eight bore holes. Debus' approach is founded on a new bioengineering procedure for removing water and soil contaminants, an area for which experts are predicting a big and profitable future.

Up to now, whenever the ground was polluted by chemicals or spilled oil, there was primarily one method for handling the damage; to dredge out and burn the earth or to take it to special disposal site. This is a blossoming business for civil engineering companies and expensive for anyone who has to accept responsibility for such contaminations of the ground.

Chemicals and fuel are continually spilling from transport vehicles involved in accidents, or illegally stored poison is found at dumpsites. Factory sites where harmful substances have been used must at some point be cleaned up. Oil tanks rust out at gas stations and residential buildings--the ground holds so much harmful muck that the disposal sites for special wastes can

no longer accomodate all the tainted earth. In addition, cleaning up by using a dredger is a poor solution; poison and oil are merely moved from one place to another, not actually eliminated.

Better than dredgers are bacteria. The fact that microorganisms clean up wastes is nothing unusual. In sewage plants, they have long been used to purify water. There is also nothing new about the fact that bacteria consume oil. In the 1970s, large chemical companies such as Hoechst and the British firm Imperial Chemical Industries experiemented successfully with special bacteria that consume crude oil as a source of food and metabolically convert it to protein, which in turn can be used as fertilizer in agriculture. The methods worked, but were abandoned when the rising price of oil made them uneconomical.

Simple Procedure

In the realm of environmental protection, however, the services of the microscopic-sized consumers of oil is beginning to pay off. If the gas station in Schmargendorf were to be cleaned up by a dredger--the authorities require the owner of the property to clean up the oil in the ground--the cost would far exceed a million marks. The gas station would have to be torn down and rebuilt, the earth dredged, carried off and stored for a considerable expense. Dieter wants to solve the problem without tearing down the building and at a lower expense by using his microbes. The maximum cost is estimated at half a million marks.

Debus' procedure is simple in principle: He collected bacteria from ground samples at the gas station. Once in the laboratory, he isolated and reproduced strains of these bacteria that exhibited a special appetite for diesel fuel. He then introduces these bacteria into the contaminated ground of the gas station through bore holes. In addition, he enhances the living conditions of the bacteria by piping in oxygen, which increases the bacteria's ability to degrade the fuel. Debus hopes the fuel in the ground will have disappeared in a couple of months.

The biochemist is doing nothing other than accelerating a natural process in the ground. Debus says, "These types of bacteria are found everywhere in naturally occurring subterranean oil deposits. Since they do not have oxygen there, however, they do not have the best living conditions. There would probably be no crude oil in the world today if oxygen had reached the deposit sites, for, over millions of years, micro-organisms would have eaten up the oil."

Debus refuses to accept the fear of risky experiments that would be understandable in cases where bacteria are genetically manipulated. Debus says his bio-procedure has nothing to do with genetic engineering, for the bacteria occur naturally and could not cause any damage.

The only intervention in nature is to increase the proportion of a specific microbe population in the ground. The bacteria break down the petroleum into water and carbon dioxide. Once the oil in the ground has been consumed

and the supply of oxygen is stopped, the oil technicians die rapidly. In the course of time, the assortment of micro-organisms in the ground returns to its original state.

Dieter Debus must fear competitors more than the possible resistance from people who visualize all new bio-engineering techniques as bringing proportionately large environmental dangers in tow. Debus, together with his Berlin "Laboratory for Environmental Analysis" (LFU), is not the only party interested in turning a profit from cleaning up industrial refuse by means of bacteria. Dozens of small and larger companies are currently tossing their hats into the ring.

The West German Shell company is currently using the methods in an attempt to clean up oil-polluted ground at their refinery in Hamburg-Harburg.

The Berlin "Organization for Economic Improvement," which wants to turn the city into a center for future technologies, has already brought together approximately 20 biological companies to form a group for studying how to implement bio-engineering methods in cleaning up grounds subjected to industrial conditions. Their competitor Debus has little respect for most of them. "They cannot do anything. They are only interested in getting some of the money that has been allocated for research."

Although the "Laboratory for Environmental Analysis" received official approval for the bacterial experiment at the gas station in Schmargendorf, it has not received public funds. Debus says, "I ran from Pontius to Pilate in the Senate for half a year trying to get support. Nothing. We are now hearing our own costs and our own risks. So far, we have funneled perhaps 50,000 marks into the project."

The Lure of an Enormous Market

No matter how the bio-pioneer from Berlin feels about his local competition, he must have greater respect for the reported market leader in the young business of bacterial decontamination: the Biodetox company in Bueckeburg. Located in an isolated area in the province of Westphalia, the Noggerath Group--Biodetox is a new subsidiary of the combine--has established a flowering business by using conventional methods for cleaning up air and water wastes. Biodetox buys bio-organisms in the USA and, in addition, develops its own strains of the small creatures, which are sold under the tradename Noggies primarily to operators of sewage plants. The company is now moving full steam ahead into the new business of cleaning up the ground by means of bacteria.

The market leader, which views itself as an innovative pioneer in this new area of technology, has already bumped heads with its Berlin competitor, LFU. In the search for suitable bacteria for cleaning up the gas station in Schmargendorf, Debus, who is laboratory supervisor at LFU, ordered a sample of Noggies from Bueckeburg. His assessment: "But the Noggies could not do a thing. The bacteria I searched for myself were better. Therefore, I used my own bacteria at the gas station."

The Biodetox managers suspect, of course, that it is their Noggies and not Debus' own bacteria that are currently doing the good deed on the diesel fuel underneath the ground in Berlin. The only catch is that there is no way to prove it. Released bacteria do not carry any sort of company trademark. It is theoretically true that patents can be obtained for microorganisms--Biodetox, for example, has several for the use of its Noggies. Practically speaking, however, most such patents can be circumvented easily.

In any case, Dieter Debus calmly brushes aside the accusation of having ripped off the Biodetox bacteria. "The only reason they want to bring up their Noggies is that they realize just what an enormous market is opening up."

The Noggerath managers do in fact realize this. The managing director at Biodetox, Hein Kroos, estimates the possible annual market for biological ground decontamination at 100 million marks--and in doing so is certainly way below the actual figure. His calculations account only for the known ground contaminations at disposal sites and industrial sites that can currently be cleaned up with bacteria. Not included in his calculation, for example, are oil spills in the ground at gas stations. Every second gas station in Germany, Kroos estimates, has such a ground problem--which would add up to 9000 cases. If each clean-up operation, such as in Berlin, cost half a million marks, this alone would be a 4.5 billion mark market.

Kroos also adds, "The market is immense. In principle, every industrial site is affected in some way." Each week Biodetox receives fifty inquiries from businesses or communities that want to correct an environmental problem by using bacteria. Ten percent of these requests come in veiled form--from industry consultants commisisoned by a client. It is good policy not to speak openly of the most profitable gold mines.

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WEST EUROPE/BIOTECHNOLOGY

FRG LAW PROHIBITS GENETIC EXPERIMENTATION ON EMBRYOS

Duesseldorf HANDELSBLATT in German 22 Apr 86 p 14

[Text] The Federal Government in the FRG intends to draft a special law for protecting embryos. This action is being taken as a result of a careful evaluation carried out by a study group for gene technology that was set up by the government.

The federal Minister of Research, Heinz Riesenhuber, based the decision to draft a law protecting embryos on the need for flexibility regulation in criminal law. Speaking in Bonn on Monday, Mr. Riesenhuber discussed the ethical and legal questions this study group was concerned with in applying new methods in the area of gene technology and cell biology to humans, as well as the impact these will have on research and law. This regulation takes priority over incorporating relevant provisions into the Criminal Code.

During inter-departmental discussions, the Federal Government focussed on the results of the report of the study group for "In Vitro Fertilization, Genome Analysis and Gene Therapy," which was set up at the initiative of the Minister of Research. The government has now presented its findings to the Cabinet "Committee for Future Technology." The Cabinet has commissioned the federal Ministry of Justice to initiate the necessary legislative measures on the basis of the joint findings.

Riesenhuber also made the following statements regarding how the Federal Government will in the future handle matters of human life in its initial stages of development:

* The draft of a law for the protection of embryos provides for a legal ban against the following: production of human embryos for research purposes; research on "surplus" human embryos past the initial stage of cell divisions (14-day limit); any research on embryos during their first 14 days of life that has not been approved by the upper-level regional authorities; the transfer of genes into human germ cells; human cloning; and the creation of chimeras and hybrids from humans and animals.

* A general regulation for the protection of embryos, based on the recommendations of the study group, will make punishable by law the intentional and negligent harm of embryos and fetuses. Experiments on aborted fetuses that are still alive will also be prohibited.

* It is the position of the Federal Government that the regional legislators will have greater control over research on "surplus" embryos during the initial 14 days of life. Riesenhuber emphasized that whether and, where applicable, in which cases research on human embryos in this early stage appears justifiable will depend on an evaluation of the individual case. As recommended by the report of the study group, such an option can be made available should the need arise in research plans that have special high priority status and that are important for protecting health. The federal legislators could not define the conditions for this. Rather, detailed administrative and legal regulations would be required that could be implemented only by the regional legislatures within the scope of their authority for health matters.

* The Federal Government does not feel that it would currently be advisable to institute a moratorium in the legal ban against the transfer of genes into human germ cells as was considered by the Enquete commission of the lower house of Parliament. Riesenhuber feels that the public could falsely interpret this as meaning that the methods can already be used and it is only necessary to prevent an abuse until a final regulation is available.

* Other measures still to be taken by the Federal Government include testing and any corresponding regulations in civil law, the legal ban on the paid procurement of "surrogate mothers," and questions regarding the marital status law as well as genome analysis. In this regard, the individual ministries are to take the necessary measures within their respective jurisdiction.

Federal Chancellor Helmut Kohl, speaking Monday in Bonn at the opening of an international conference of scientists titled "Neuromedicine and Ethics," called on the researchers never to forget, throughout all creative activities, that they themselves are not creators. With the new methods and knowledge in bioscience and genetic engineering in mind, the Chancellor said, "As a creation of God, man must remain a measure of all things." The capacity to do something, Kohl said, must not become a drug that weakens ethical standards. He said that the most relevant question for modern biosciences is "how we can preserve and defend the image of man as a unique and distinctive individual."

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WEST EUROPE/COMPUTERS

SIEMENS SUPERCOMPUTER DEVELOPMENT DEPENDS ON JAPANESE R&D

Hamburg DIE ZEIT in German 25 Mar 86 pp 25-26

[Article by Gunhild Luetge and Hermann Boessenecker: "The Dependent Giant: Without Japanese Help, Siemens Hardly Stands a Chance in the Supercomputer Business"]

[Text] Siemens AG first calmed down its customers. No thought was being given to withdrawing from the large-scale computer market, according to statements last Monday from the headquarters of the electronics giant in Munich. Then the managers in charge packed their bags and took a trip to Tokyo. There they were to sound out their cooperative partner, Fujitsu, on how things stood with their future cooperation. A lawsuit between the Japanese company and its American competitor, IBM, had cast doubt on the situation.

For 7 years, the Japanese have been supplying the German company with large-scale computers, which Siemens sells under its own name as Series 7800. The interesting thing about the Japanese computer is that it operates according the principle of machines made by IBM, the leader on the world market. They also use all IBM user programs. Customers who have often invested millions of marks in this software are thus no longer dependent, for better or for worse, on the market leader--thanks to the IBM-compatible machines by Fujitsu or other manufacturers.

Then-computer chief Anton Peisl of Siemens saw an opportunity in this at the end of the 1970s. Besides Siemens' own computer family, which it developed independently (the 7700, later the 7500), he included the IBM-compatible computers from Japan in his offerings, in order to thus be able to make inroads into the clientele of the American market leader.

He succeeded in this to a moderate extent. Approximately 10 percent of the DM 4 billion achieved by the Munich company in computer sales comes from the Far East. What is more important, however, is that the German company, with an overall sales figure of DM 54 billion, has found a connection with the highest class of computers through its cooperation with the Japanese.

It is now precisely the similarities of these computers to IBM products that is causing the Japanese partners some trouble. Every machine has a so-called

operating system, which initially gets the user program going. MSP is what the Japanese call their counterpart to MVS, the IBM system, and it is around this special type of software that the fight between IBM and Fujitsu has broken out. The U.S. computer giant sees an infringement on its copyright. Deliveries of the Japanese operating system have had to be halted.

"No cause for dramatization," Siemens director Helmfrid Fuelling has said reassuringly. This because the vast majority of Siemens customers do buy the clearly less expensive hardware by Fujitsu, but then run it with the IBM operating system. Even IBM spokesman Paulus Burkert is quick to affirm, "We will continue to offer our operating system to anyone who wants it, including any Siemens/Fujitsu customers." Why then the hasty departure by Siemens managers for Japan? After all, the contract on computer deliveries does not expire until 1989.

There is a deeper reason for their haste. Fujitsu could have basically lost its taste for the IBM-compatible market and henceforth endeavor to leave the American giant behind. In this way, for example, the large-scale Hawk machine, which has already been announced for 1987, would no longer fit into the IBM world. It may be at last too expensive and thus uneconomical to have to slavishly go along with every product change by the market leader.

Those who have nonetheless attempted to do so have in the past paid dearly for it. Hitachi and Mitsubishi were even forced to undergo an embarrassing industrial espionage affair when overly eager employees in the United States tried to clandestinely buy new secrets on IBM computer architecture. Indeed, whoever is counting on compatibility with IBM software has to know about the plans of his model company as soon as possible. In order to no longer fall into the hands of FBI agents, Japanese companies came to prefer concluding agreements with IBM and paying a great deal of money for that. Fujitsu did this as well, which nevertheless did not rule out the possibility of difficult conflicts concerning copyrights, as the latest fight shows.

Should Fujitsu withdraw, the tiresome business of meticulously comprehending the technical nitpicking of the market leader would be left to the Amdahl firm, together with several other computer manufacturers. The Japanese have just under a 50 percent share in this American company. Fujitsu developed the computer in the 1970s with its founder, IBM emigrant Gene Amdahl. Amdahl draws only its systems parts from Japan; it builds the computers itself.

For Siemens, Japanese abstinence would mean that it would scarcely stand a chance in the market for large-scale computers. This because instead of working up its own new models, the Germans have installed Fujitsu machines in their own series. They adapted their own BS 2000 operating system to two jumbo computers that the Japanese are building especially for Siemens.

With this dependence, it is amazing that Siemens is not yet involved in a promising German project. Together with Krupp Atlas Elektronik GmbH and Stollmann GmbH, the Association for Mathematics and Data Processing (GMD)--one of the nation's major research institutions--has founded a company with an ambitious goal: to develop the first German supercomputer. It will be

called Suprenum and will function according to an entirely new computer concept. The first marketable product should be available in 2 years.

Manager Fuelling does foresee producing jumbos, based on German development, by 1990. Nevertheless, the Germans are dependent on supplies from Japan.

In another case as well, Siemens discovered that evolved know-how cannot be made up for in short order. In order to gradually decrease the threatening dependence on Japan for the tiny electronic building blocks--microchips--the company got to work, with state financial assistance, on developing and producing its own models. But like with the tortoise and the hare, the Japanese have to this day remained first in this race.

Siemens first wanted to design its own so-called one megabit chip, a memory chip with significantly higher capacity than its predecessors. Up to then there had been a fourfold increase in the performance of the silicon chips, which are the size of a fingernail, every 4 years. However, while Siemens is still in its test phase, the Japanese electronic goods will soon be rolling off the assembly line. This lead was not altered by the fact that Siemens abandoned its own research efforts in order to buy into Japanese know-how.

For the next generation of chips, the four megabit chip, the electronics managers are even facing trouble from Minister of Research and Technology Heinz Riesenhuber. It is true that he was willing to write off the assistance for the one megabit chip that was already paid out; however, he is not prepared to throw away millions more in funding for the next product. For this reason, he is making further support dependent on the condition that Siemens make up for the lead enjoyed by the Japanese, in this case NEC and Toshiba. Chances are poor, because once again the Japanese are very close to their goal. They recently demonstrated their first successes in the development of the new superchip.

Just as in the case of the large-scale computer, a spokesman for the company affirms in this case as well: "We will at any rate continue to acquire our own know-how." Depending on how far along the Japanese are already, Siemens will have to cross out financial assistance from Bonn. And not only that: Should Siemens come onto the new chip market with the usual delay, the company would also have to waive initial profits. This is because the only one who can earn money on electronics is the one who is ahead. It is true that the company, which has a financial cushion of a good DM 20 billion, can cope with a great deal. However, no one will be surprised any longer if Siemens confines itself to buying another ticket to Japan.

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WEST EUROPE/COMPUTERS

BULL CALLS NEW ASSEMBLY PLANT EUROPE'S MOST MODERN

Paris LES ECHOS in French 27 May 86 p 16

[Article by G. BZ: "Europe's Most Modern 'Square' Plant"]

[Text] Bull has spent 18 months and invested 225 million francs in building, besides the highway at Villeneuve-d'Ascq in the Pres area, what is called "Europe's most modern" plant by those who participated in its computerization, in particular, the Renault group engineering experts.

Beginning operations lasty January with 300 employees, average age 28, after a headline-making move from Marcq-en-Baroeul for reasons "related to a vital physical necessity for space, especially because of cohabitation with Thomson's co-tenants" declared management, this ultra modern plant is a real showcase.

Designed to "make Bull's microcomputer plan succeed" and to respond to the market growth of the large range, the plant is programmed for the assembly of all the company's office automation and work stations: the Micral 30 microcomputer, and starting in January 1987, 60 multistations, keyboards and control units for Questar stations will be added. The goal is 300,000 manufactured units per year (there are 3 manufactured units in each microcomputer: a central processing unit, keyboard, and screen) and the production plan is for 200,000 starting this year, including 200 microcomputers per day.

This will be a showcase for the range, as well as for the organization. There is no stock of finished products, although this would certainly be relatively simple, since all the production is sent directly by semitrailer to Bull, and there is exceptional flexibility, which, if necessary, would allow the Micral 30 assembly lines to be converted in a single night to Questar 400 production if a large order were received.

This all points to a flow strained--not yet to the maximum--in a super automated circuit from production management to packaging operations: five manual operations are required for the manipulation of the material during its journey through the plant, which currently takes 15 days as compared to an average of 1-1/2 months in the old Marcq plant, and which will soon be 5 days.

The basis of this time savings is the bar code printed when "the basic element" arrives, after which it is placed in a container as it enters the plant, and the code is modified as necessary during the development of the product after an optional trip through an automatic 13,000 container storage warehouse.

From storage to "kitting" where the operators combine in a single container all the elements required for assembling a unit, 5 wire-guided trolleys are used for material handling, delivering full containers to assembly cells within which transport from one operation to another is also carried out by a mechanized transport system, and the empty containers are recovered, then reintroduced to the beginning of the circuit.

Once assembled, the finished products are sent to reliability testing stations--where each is switched on for 24 to 72 hours and subjected to a heat test--then sent to the final test area. Finally, from packaging and pallet loading, also fully automated with the exception of one operation, to placing into the cardboard packing box, all operations are accomplished with the assistance of a material handling arm.

It would be difficult to automate the operation further. However, it is being done: studies are under way on programmable robots which could, for example, carry out screwing or kitting operations. And progress can still be made in the operation of pallet loading lines which would allow up to 28 continuous product references to be stacked up.

This plant is called "square" and will actually become square in 1988 if the market continues to justify the planned expansion (from 160 x 140 meters to 160 x 160 meters), although it has not yet created any jobs at Bull, whose old Marcq-en-Baroeul staff simply moved to the new location.

No new jobs have been created at Bull, but they have been elsewhere. The following operations have been subcontracted: management of the company cafeteria; security, which is especially tight because the plant is protected by, among other things, an anti-intrusion system; landscape maintenance; and heating.

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BRIEFS

CNR'S 'EXPERT SYSTEMS'--The National Research Council has officially launched two "strategic projects" regarding computer-based "expert systems." Their purpose is mainly that of determining work objectives and organizing Italian know-how in this field, which CNR and some industries and universities share. It must be pointed out that "expert systems" are computer-based facilities which use artificial intelligence techniques to establish the know-how of a human expert in a given field. They are, consequently, high-level computerized advisers. The first project concerning the "expert systems" in general is managed by Tommaso Lazzari (former CNR executive now working for STET), was allocated funds amounting to 400 million lire for the first year. Two thirds of the sum will be used outside CNR. Included among the objectives are: to work out methods for knowledge representation in "intelligent" databases; experimental applications for agriculture; health service management; and interpretation of legal and juridical texts. The universities of Rome (La Sapienza and the "Catholic university), Turin, Pavia, Genoa, Milan, Padua and Bologna and two Italian companies, Data-base and Cids, are taking part in this plan. Fabrizio Ricci of CNR's Institute for Scientific Research and Documentation is the manager of the second project which will develop the "expert systems" in the medical field. This project received a first-year allocation of funds amounting to 250 million lire for CNR facilities only, which will work along with the outside companies engaged in the first project. The plan's purpose is that of developing "expert systems" in the fields of cardiology, pancreas surgery and the computer-based technologies relevant to these applications. Moreover within the scope of this project there is a center for the diffusion of both knowledge and techniques of "expert systems" that will be set up in 1986, especially to support physicians wishing to acquire this "intelligent support" for their activities. [Text] [Turin MEDIA DUEMILA in Italian No 30, Apr 86 p 94] 8624/12948

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WEST EUROPE/SCIENTIFIC AND INDUSTRIAL POLICY

RELATED EUREKA PROJECTS DISCUSSED

Turin MEDIA DUEMILA in Italian No 30, Apr 86 pp 87-88

[Article by Giampiero Gramaglia: "New Esprit-Linked Project;" first paragraph is MEDIA DUEMILA summary heading]

[Text] Three Italian projects. In June, London, a meeting on the "Eureka" program. "Race" pilot-phase is starting.

Brussels.

"Esprit," the ECC's microelectronics-developing program, is financing 11 new projects in the software field, which are the best of 40 projects bid on in last autumn's extraordinarily competitive examination. (All of them have been judged as having "high quality" by a group of independent experts.) The projects necessarily had to be selected and reduced from 40 to 11 because of the scarcity of available funds: an EEC economic contribution of 18.9 million ECU, over 27 billion lire, has been provided to cover only half of the research expenses (the remaining half must be paid by the enterprises and research centers participating in these projects.)

According to Karl-Heinz Narjes, vice-chairman of the European committee in charge of research and industry departments, the whole software field of the Esprit program provicdes (through this action) a possibility to improve the products' quality and the European industry productivity.

Italy takes part in 3 projects out of 11: "Delphi" is participating with British and French companies as well as Bath University in a research program named "Chameleon" (Dynamic software migration between cooperating environments); "Enidata" is participating with French companies and German and Greek research centers in a research program named SED-SETL, experimentation and demonstrator; "Csata" is participating with French, Danish and Spanish firms in a research program named SFINX, Software Factory Integration and Experimentation.

London

The organization of the June meeting in London of the ministers whose countries participate in the "Eureka" program, which is, in a certain sense,

the European response to SDI, the U.S. Strategic Defense Initiative, is going on at an accelerated pace, through meetings of experts and officials. At the same time Belgium officially proposed Brussels as a seat of the new organization's permanent secretariat.

The European Trade Union Federation [CES] proposed that the "Eureka" program should deal with non-military research only and be complementary to the research programs the European Community carries out. Moreover CES wants workers to have an "active role" and be "informed and consulted" whenever technological changes are to be started.

The London meeting in June is likely to give a green light to 16 new projects that will be added to 10 other projects launched in November in Hannover. The 16 new projects, among other things, concern new materials for engines, the aerospace industry, detection of vehicles noise sources, computer-aided medical diagnosis, dispersal chemical wastes, expert systems, advanced software, integrated circuits, third generation robots and so on.

Brussels

The pilot-phase of the "Race" program, the EEC's program for telecommunications, had a good start, with the launching of 31 projects (for a total expenditure of 40 million ECU, amounting to as much as 60 billion lire). They have been carefully selected by the managing committee of the program in which administration representatives of the "Twelve" participate.

The European committee, which is the Community executive committee, is of the opinion that such projects enable Europe to lay the foundations of the 21st century telecommunications systems. All the contracts have already been drawn up and many of them have been signed and put into execution. The EEC will share 50 percent of the costs.

Strasbourg

By adopting unanimously a resolution that Dutch socialist Alman Metten presented to the Assembly, the European Parliament has declared its opposition to unilateral controls on technology transfers by the United States (such controls are to be added to those of Cocom, the organization regulating exports from West to East).

The European Parliamentary Assembly believes that such an attitude is limiting in substance, the European access to U.S. technology. In his resolution Metten also suggests to the European Committee that it should determine the compatibility of Cocom's regulations with the EEC ones and that the "Twelve" should take the initiative in modifying Cocom procedures.

But, at the same time, the European Parliament acknowledges that a European Community having the capability to compete technologically with U.S. and Japanese product-lines would be the best guarantee to avoid unilateral controls on technology transfers by the United States.

Brussels

In the European Community member countries there are remarkable differences in home computer prices, but consumers have many problems in taking advantage of the situation because of the existing difficulties in having guarantees respected outside the country where the computer has been bought.

This is the result of a survey the office in Brussels of the European Consumers Association (BEUC) has carried out. According to the survey VAT rates differences do not account sufficiently for computer price differences among EEC countries, but such differences rather originate from the producers attempt to create barriers between the single national markets. In this way Germany and the Netherlands, major home computer producers, have the cheapest prices; Ireland and Denmark have prices one-quarter or one-third higher and Greece even one-half higher. BEUC's survey doesn't consider Italy.

Brussels

To keep the overall picture of technological and scientific knowledge complete and up-to-date; to promote demand in Europe, arising from innovation mainly related to major projects; to foster European supply capability; this is a three-pronged strategy that should enable the industry of the "Twelve" to respond effectively to the U.S. and Japanese challenge in the forefront of information technologies.

Based on a set of recommendations which the Council of Ministers of the "Twelve" and the European committee are examining, this strategy has been drawn up by the EEC's Economic and Social Committee (CES), which is the consultative committee of the European Community representing all the producing classes and consumers, following a report by the Italian official Romolo Arena of the employer group.

Arena's report is a part of the CES's thre-part set of recommendations. The remaining two parts are relating to the social aspects of new technologies and relations between new technologies and the European Community's research and development programs.

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WEST EUROPE/SCIENTIFIC AND INDUSTRIAL POLICY

BRIEFS

SELENIA-ESPRIT--As a further step toward the development of the Esprit project, a strategic program for research and development in computer-based technologies, a group of European companies and research boards led by Selenia (IRI-STET group) have contracted with the European Community Committee for the development of a new generation of systems capable of carrying out a real time utilization of radar observations from satellites. Some companies and institutes such as Dornier (West Germany), GEC Research and Hunting Technical Services (Great Britain), Thomson CSF (France), the Polytechnic Institutes of Milan and London also belong to the group. Only radar detection is suitable for all weather, but it takes several hours for current system to process the data. In March 1985 this group of companies submitted to EEC authorities a 5-year plan for the development of new image-processing technologies. They proposed a program which envisioned the research and implementation of a satellite-based radar system especially designed for crop monitoring, sea surveillance for navigation safety and monitoring for pollution control. A part of the program to study the system feasibility and definition has been approved by the EEC, which also shares 50 percent of the expenditure. This project, named ARTS IP (Adaptive Real Time Strategy for Image Processing), also aroused the interest of the European Space Agency (ESA), which is considering the possibility of including it in its programs. [Text] [Turin MEDIA DUEMILA in Italian No 30, Apr 16 p 90] 8624/12948

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WEST EUROPE/TECHNOLOGY TRANSFER

ESA PARTICIPATION DENMARK'S BARGAIN OPPORTUNITY TO HIGH TECH

Copenhagen BERLINGSKE TIDENDE in Danish 6 Jun 86 Sec 1 p 3

[Article by Thorkild Dahl: "Christian Rovsing Urges More Money for Research"]

[Text] The Education Ministry should be given more money for investment in high technology so that Denmark can participate in the European joint space effort, ESA.

This statement was made by director Christian Rovsing, civil engineer, who added that "it is alarming that Denmark is not participating more in joint European efforts than the government proposes in its action plan for research and development.

"The European space effort is a very cheap ticket to new technology. So cheap that it is hard to find anything else that can compete with it," Christian Rovsing said in the "Political Letter" that will be sent out by the Social Democratic News Service tomorrow. In the action plan for research and development the government has set aside 20 million kroner in 1987, rising to 40 million in 1989, an amount that will be divided between the European space effort and other European projects.

"The space program will create a high-tech infrastructure in Europe worth 80 billion kroner," said Christian Rovsing.

Denmark participates in the European space effort and pays 1 percent of its costs. In some areas Denmark has brought home twice that amount.

ESA's area of activity will now be expanded by three programs, namely the Ariane-5 first booster rocket, the Columbus space station and the Hermes manned space shuttle.

The government wants to limit Denmark's participation to the Columbus program while director Christian Rovsing maintains that the Ariane, the Columbus and the Mermes "represent a total program that would be hard to split up."

6578
CSO: 3698/506

MICROCOMPUTER PRODUCTION IN SOCIALIST COUNTRIES

Budapest SZAMITASTECHNIKA in Hungarian No 5, May 85 pp 4-5

[Article by Dr Peter Broczko: "Microcomputer Manufacture 1985, Socialist Countries"]

[Text] One year is a very long time in the history of microcomputer manufacture. So it is worth while to prepare a balance of the past year, about all that changed in the European socialist countries in 1985.

Bulgaria

Just one type appeared in the category of cheapest computers, the Balik intended for kindergartens. It has a machine code program in an exchangeable read only memory that the children can play with. Only an adult can exchange the program, so the solution is rather ill-matched.

Series manufacture of the Pravec 8D which appeared last year, it is compatible with the Oric-2 and was intended as a cheap machine, did not begin, so a home computer of Bulgarian manufacture cannot be distributed yet. They continued to supply the schools with machines manufactured under various names which are compatible with the Apple II. Special classrooms containing 20-40 such machines opened in the secondary schools in the larger cities.

The most important event of 1985 was the final sinking of the star of the powerful microcomputers based on the Motorola 6800 which had been made with a dozen model designations to be built into desks. Only one "modernized" version appeared in 1985, the IZOT 1041. It had a new form but it had the old content.

The new path is certainly the Z80 based machine with a CP/M compatible operating system. But to make an 8 bit model switch in 1985! This is certainly a unique event in the history of microelectronics. To ease the model switch there was a new "two-faced" type, the Orgtech 80/600, in which one can find the equivalent of both the Motorola 6800 and the Z80 microprocessor.

The machines compatible with the IBM PC are absolute among the 16 bit machines. The assortment of these expanded further. The Intelex is being made in larger numbers. It is an interesting feature of the ES 1832 that it is made of only socialist microelectronic parts, or of parts which will be soon

replaced by a socialist equivalent. The software development emphasis also shifted to the IBM PC line. A fundamental transformation of the organizational structure and the creation of a new dynamic institution, the SPS, may have played an important role in this.

Microcomputers corresponding to the LSI 11 are still present, but with a significance smaller by an order of magnitude compared to the machines equivalent to the IBM PC. There is only one new model among these, the image processing oriented IZOT 1060, the software for which was made in cooperation with the Hungarian SZKI [Computer Technology Coordination Institute]. This model fills a gap in this cheaper price category and so is a worthy competitor of the A 6470 family, made in the GDR and so far the only image processing system manufactured in a socialist country.

We are able to report on only one new item among the microperipherals. Bulgaria has produced the first daisy wheel microprinter in the socialist countries, the 18 kilogram Evmolpia 100. This was developed from an electronic daisy wheel typewriter which had been made suitable for use as a microprinter in 1984.

At the same time the Bulgarian computer technology industry, which specialized for magnetic mass storage devices, has a great debt in that they still have not introduced Winchester stores which can be connected to a microcomputer.

Czechoslovakia

This country can be characterized as a country of extraordinary contrasts last year. For example, in 1985 they exhibited at an international fair, in Brno, a gigantic microcomputer (with midget performance), the KA 10, which had been made in the 1970's, while 3 meters from it stood the first publicly exhibited VAX compatible machine of the socialist countries, the SM-52/12 compatible with the VAX 11/780. (Other countries are also dealing with development of VAX equivalents--the 11/780 in Bulgaria, the 11/750 in the Soviet Union and the 11/730 in Hungary--but the others have not yet exhibited their products publicly.)

In the home computer category they are producing the IQ 151 in series manufacture and have already made 1,500 of them. They promise a similar series for the SMEP SP 01. But the Czechoslovak consumer cannot get access to microcomputers of domestic manufacture yet.

In the professional category series manufacture of the SMEP family was on the agenda and several hundered were made. The only new Czechoslovak model of the year was an IBM PC equivalent member of this family, the SMEP PP 06. As in the case of the VAX equivalent in 1984 the news of this preceded its physical appearance or exhibition.

Czechoslovakia has still produced no products in the area of microperipherals.

Poland

The Polonia undertakings brought real ferment into computer development. These are mixed enterprises created with a foreign participant where even the foreign party must be a Pole who has "become a foreigner." The Polonia takes care of the modern parts and peripheral base while the partner in Poland provides assembly.

In 1985 these small undertakings literally threw themselves upon the production of machines compatible with the IBM PC and they threw on the market machines with large capacity Winchester stores.

Manufacture of the Meritum continued in the home computer category and the Elwro-700 appeared as a new product manufactured in large series.

There was a model switch in the 8 bit professional machine category which had been planned for large series manufacture. The large Elwro-500 which had been built into a desk was replaced by the Elwro-600 which can be put on a desk and is compatible with it, but which unfortunately is still obsolete.

The highest performance member of the new Elwro family, the Elwro-800, is already IBM PC compatible. (It is not by chance that the Elwro family received the gold medal at the Poznan Fair.) The change in the microelectronic element base for the Mera-60, corresponding to the LSI 11/02, belongs in the 16 bit category. With an unchanged name it offers a good bit greater performance and an expanded, rich program supply.

Large series manufacture of the D-100 matrix printer continued in the area of microperipherals.

Hungary

We can report as a serious new element in the home computer category that in the spring of 1985, for the first time among the socialist countries, there appeared a computer of domestic manufacture which can be bought by anyone off the street, on the spot. This is the Primo. More than 3,000 of them have been made already, thus setting a new record--no model had been made in such a large series in a socialist country. Manufacture of the Videoton TV-Computer and the Homelab-3 was gearing up also. By the end of the year all three could be obtained in the shops.

The cheap machines include the PTA-4000, which has plus 16 K bytes of operating memory, can be carried in a pocket and can be programmed in the BASIC language. The Norax 64 portable data collector is also a new item.

Only a few, delayed, Z80 based new models appeared in the 8 bit professional category. It must be noted that at the same time manufacture of a number of professional, 8 bit, large series machines was completely abandoned. Manufacture of the VPC, VPPC and M08X was stopped.

In 1985 the market swirled around the IBM PC equivalents. The greatest novelty was the appearance of the Varyter XT, because in an unprecedented way it was announced immediately after completion of a 150 unit series.

In addition to all this the chief player in 1985 was the price. By the end of the year the constantly dropping prices were followed by a significant price reduction monthly. Thus a computer of domestic manufacture compatible with the IBM PC, in a minimal Winchester store configuration, can be obtained today for half a million forints. This corresponds to a price reduction of about 50 percent in one year. And the extraordinary reduction in the price of precisely the IBM PC compatible machines makes the 8 bit professional machines virtually unmarketable, because they simply cannot be produced as much more cheaply as their performance is smaller. The price of the machines compatible with the IBM PC has dropped virtually to that of the 8 bit professional machines, so with almost the same investment practically no one will choose the latter.

A number of significant new items have appeared in the area of microperipherals. The first Winchester store of the socialist countries has been developed and introduced. This is a product of the MOM [Hungarian Optical Works] and it has a capacity of 10 M bytes. Series manufacture of it will begin this year.

The first laser microprinter of the socialist countries has been introduced, a product of Videoton. A new element in the area of printers is the spread of the matrix printer market; these are already advertised even in the daily papers. The cheapest matrix printer of the socialist countries was introduced in 1985; this is the DCD-PRT-42 which costs 24,000 forints and was developed for the Primo.

The GDR

In the area of home computers many have turned to the HC 900 microcomputer, which was replaced at the end of 1985 by a new model, the KC 85.

In the category of 8 bit professional microcomputers they are manufacturing in large series the Robotron 1715 which appeared in 1984; these are exported in large numbers to the CEMA countries.

In the 16 bit category the most important new item is the appearance of the first GDR made machine compatible with the IBM PC, which uses the Soviet equivalent of the Intel 8086 microprocessor. They have also made a "two-faced" A 5120 machine, the new side of which is based on a U 8000 microprocessor using the UNIX operating system (this microprocessor is the GDR equivalent of the Z 8000).

The industry of the GDR has exhibited many new items in the area of microprinters. They have expanded their 6311/12 printers with graphics possibilities and have introduced a new type with the designation 6313/14.

The first check printer of the socialist countries has been developed, with a modern cutting device. This bears the designation 6316. They have also introduced a new well designed thermal printer, with the model number K 6304.

But from the viewpoint of the socialist countries the most important thing was the starting of large series manufacture of the S 6010 daisy wheel electronic typewriter which can be connected to a microcomputer.

At present practically all the text processing systems being made in the socialist countries use this typewriter as a printer. In 1985 they shipped 5,000 of them to Hungary alone.

Romania

In my opinion the fewest changes in the area of microcomputer technology took place in Romania last year, out of all the European socialist countries. They did not introduce any new models but concentrated their forces primarily on gearing up the manufacture of already developed types. Despite this it is still not possible to get a home computer of Romanian manufacture. The CUB, 8 bit professional microcomputers are being made in a larger series. They did not show anything new in the area of microperipherals either.

The Soviet Union

The Elektronika BK 0010 home computer appeared in the shops, at a price of 550 rubles. For the time being it can be obtained only by signing up in advance, after a certain waiting period. Series manufacture of the Agat, compatible with the Apple II and announced in 1984 as a school computer, did not begin and there are still no microcomputers in the schools.

Large series manufacture of two obsolete types, the SM-1800 and Iskra 226, built into a desk, continued in the 8 bit professional category. There is as yet no more modern type with similar performance which can be put on a desk to replace these.

Although there is a Soviet machine compatible with the IBM PC, the Iskra 250, the manufacture of it has not begun. Perhaps the Minsk Computer Factory will manufacture machines in this category in large series, but for the time being they have not even shown a prototype.

To sum up we can state that for the first time there appears to be a striking difference among the CEMA countries, both in regard to the technical characteristics of the types which have appeared and in regard to the manufacturing series size. It follows from this that the achievements and problems appearing in the several countries are of a quite different character.

The generalizable achievements of 1985 are that

--the 16 bit professional microcomputer category has been homogenized, and by the end of the year they were making 39 types of IBM PC equivalents in the socialist countries, with manufacture of them taking off;

--the first microcomputer types manufactured in the CEMA countries which can be obtained in shops have appeared;

--the first Winchester store, daisy wheel microprinter and laser microprinter have appeared;

--an oversupply of microprinters using the matrix principle developed.

But the fundamental problems inherited from earlier years increased further in 1985, namely that

--the scattered nature of the CEMA countries in the area of microcomputer technology increased, in regard to both development and manufacture;

--definite progress was not made in the area of providing peripherals fitting the 16 bit, high performance microcomputers. That is, there is no real offering of Winchester stores, laser microprinters or large capacity or 3.5 inch floppy disk stores and a continual operation magnetic tape casette unit has still not appeared.

These are such fundamental difficulties that a radical change or solution can be brought only by the coordinated efforts of the 5-year plan now beginning.

Microcomputers Which Appeared in the Socialist Countries in 1985

Model	Manufacturing Firm	Microprocessor Type	Bits	Memory	N.	Operating System	Program Languages	Price
BULGARIA								
Balik	IZOT, Sofia	SM-601 (M6800)	8	64/16	1	Training purpose	A	
ES 1832	IZOT, Sofia	8088	16	256	1	MS-DOS	IBM PC compat.	
Intelext	IZOT, Sofia	8088	16	640	1	MS-DOS	IBM PC/XT compat.	
IZOT 1041	IZOT, Sofia	SM-601 (M6800)	8	64	1	Economic	Their own; BAL	
IZOT 1060	IZOT, Sofia	K1801VM2	16	64	1	Image process.	B; F; P	
Orgtech 80/600	Computer Factory, Silistra	Z80/M6800	8	64	1	CP/M; MDOS	A; B; C; F	
Pravec 16C	Computer Factory, Pravec	8088	16	256	1	MS-DOS; portable	IBM PC compat.	
Pravec 16MN	Computer Factory, Pravec	8088	16	256	1	MS-DOS	IBM PC compat.	
CZECHOSLOVAKIA								
SMEP PP 06	VUVT; Zilina	8088	16	256	1	MS-DOS	IBM PC compat.	

Microcomputers Which Appeared in the Socialist Countries in 1985

Model	Manufacturing Firm	Microprocessor Type	Bits	Memory	N.	Operating System	Program Languages	Price
POLAND								
Compan-8	Mera-Elzab; Zabrze		8					
Complex XT	Komplex EFC	8088+8087	16	128-1024	1	PS-DOS 2.2	IBM PC/XT compat.	
CS-88 PC	Computex	8088+8087	16	64-640	1	PS-DOS 3.0; CP/M-86	IBM PC compat.	
Elwra-600	Elwra Wroclaw	8080	8	64/8	1	CP/M 2.2	A; B; C; F; P	
Elwra-700	Elwra Wroclaw	U 880 (Z80)	8	16-48/8-16	1	MONITOR	A; B	100,000 PLZ
Elwra-800	Elwra Wroclaw	8088	16	256	1	MS-DOS	IBM PC compat.	
Emix-86	EMIX	8086	16	128-640	1	PC-DOS; CP/M-86	IBM PC compat.	
IMP 86	IMPOL II	8088+8087	16	128-640	1	PC-DOS 2.0; CP/M-86	IBM PC compat.	
Mevax 86	Mera-Ster	8088+8087	16	64-640	1	PC-DOS	IBM PC compat.	
Quasar PC	Karen	8086	16	640	1	PC-DOS	IBM PC compat.	
START PC/XT	Starcomp	8088+8087	16	64-640	1	MS-DOS; CP/M-86	IBM PC/XT compat.	
HUNGARY								
Controll MC84-W	Controll Small Coop.	Z80	8	64	1	CP/M	A; B; F; P	
Cosy Fama	MTA SZTAKI	U 8000 (Z8000)	16	512-4096 64-192	8	HUNIX (UNIX)	F; P; and C lang.	0.6-4.8 M HUF
Cosy Famulus	MTA SZTAKI	U 8000 (Z8000)	16	512-1024 16-144	1	HUNIX (UNIX)	F; P; and C lang.	1 M HUF
Data Star	Data Manager	80286	16	512-1024	128	MS-DOS	IBM PC/AT compat	
Eaststar	Instrument Tech.	8088/M68000	32	1024	16	MS-DOS; UNIX	A; B; F; P; and C lang.	10,000-20,000 HUF
Emily	Medicor	Z80	8	64	1	CP/M 2.2	A; B	100,000 HUF

Microcomputers Which Appeared in the Socialist Countries in 1985

Model	Manufacturing Firm	Microprocessor Type	Bits	Memory	N.	Operating System	Program Languages	Price
HUNGARY continued								
Homelab -3	Color Coop., Dombovar	Z80A	8	16-64	1	Their own	A; B	10,000-20,000 HUF
IM 16	Instrument Tech.	8088/ M68000	32	2048	8	CP/M-68K UNIX	Modular	
Master	BHG FI	8085	8	398/16	1	Mireal (MP/M)	A; B; P; FORTH	
MAT	Instrument Tech.	80286	16	512-3072	19	MS-DOS; XENIX	IBM PC/AT compat.	
Mikro-controll 84	Controll Small Coop.	Z80	8	64	19	MC-DOS (CP/M)	A; B; P; FORTH	
Mikro-controll 86	Controll Small Coop.	8086	16	256	19	MS-DOS	IBM PC compat.	
Mikro-sztar 1103	SZAMALK	K1801VM2	16	64	1	RT-11; CTS-300	B; F	
Multi WS	Instrument Tech.	M68000	32	256	8	CP/M-68K	A; B; F; P; and C lang.	
MXT	Instrument Tech.	8088	16	256	1	MS-DOS	A; B; F; P	
Norax 64	Data Manager	Z80	8	64/4	1	Portable	A	
Pro/Primo	MTA SZTAKI Cosy	Z80	8	64/8	1	Monitor	A; B; FORTH	28,000 HUF
Profi PC	Pro-controll; Szeged	8088	16	256	1	MS-DOS	A; B; F; P	
Proper-16M	SZKI	8088	16	256/48	1	PROPOS-16	B; F; P	271,000 HUF
PTA-4000 +16	Communications Engineering Coop.	LH 58001	8	19.5/16	1	Monitor	B	10,000 HUF
Raab-80	New Corn Ear Producer Cooperative, Gyor	Z80A	8	64/32	1	MC-DOS (CP/M)	A; B; F; P	
SAM-E-DS	MMG Automatic Works	8085	8	62/2	1	FDOS	A; B; P; PL/M	

Microcomputers Which Appeared in the Socialist Countries in 1985

Model	Manufacturing Firm	Microprocessor Type	Bits	Memory	N.	Operating System	Program Languages	Price
HUNGARY continued								
Slave	BHG FI	8085	8	62/16	1	MSYS (CP/M) NUCLEUS	A; B; P; FORTH	
Super XT	Mester-Globus	8088	16	256	1	MS-DOS	IBM PC/XT compat.	
TPA-11/170	MTA KFKI	AM 2900	16	64	1	RT-11	B; C; F	
Varyter XT	MTA SZTAKI Cosy	8088	16	256-704	1	MS-DOS	IBM PC/XT compat.	440,000 - 1 M HUF
GDR								
A 5120.16	Robotron	U880/ U8000	16	256	1	MUTOS-U (UNIX)	A; B; C lang.	
A 7100	Robotron	K1810NV86	16	256	1	SCP 1700 (CP/M-86)	A; B; F; P; CDL	
K 8922	Robotron RBK	U 880 (Z80)	8	64	1	SCPX 1526 (CP/M)	A; B; P	22,930 SUR
KC 85	Microe, Muhlhausen	U 880 (Z80)	8	16-64	1	Monitor	A; B	
SOVIET UNION								
ELEKTR.MS 1211	VUM, Kiev	K1801VM2	16	64-256	1	RT-11	B; F	
SM 1810	VUM, Kiev							

Notes:

The N. column is the number of work stations.

For microprocessor type we have indicated the functional analog in parentheses.

We give the size of the memory in K bytes as follows: operating memory: minimum-maximum/read only memory: minimum-maximum.

In the case of number of work stations the "19" indicates those multi-station systems for which we do not have precise data.

We have abbreviated the program languages with the initial letter, thus A=Assembler, B=BASIC, C=COBOL, F=FORTRAN and P=Pascal.

The prices are only informative; the currency is designated in accordance with the new ISO standard.

8984
CSO: 2502/47

COMPUTERS INSTALLED FOR ONLINE PRODUCTION AT RABA ENTERPRISE

Budapest SZAMITASTECHNIKA in Hungarian No 5, May 85 pp 1, 6

[Article by A. K.: "Raba Converts to Online Processing"]

[Text] Large computer systems serving the goals of an extensive online production control information system and realizing the possibilities of a remote processing network have been put into operation at the sites of the Raba Hungarian Car and Machine Factory. IBM 4361 large computers (two are Model 3 and two are Model 4) are in operation at the three units in Gyor and at the Mosonmagyarovar unit and seven additional System/36 minicomputers are in operation at sites outside of Gyor. An eighth S/36 has been put into operation to serve agricultural parts sales directly. About 350 picture screen terminals will be part of the network system, about 20 of them will be IBM PC/XT personal computers (of these seven are systems with multiple work stations) and there will be about 100 desk printers. The software supply for the four large computers, each of which has 2 M bytes of central memory and 840 M bytes of magnetic disk storage (560 M bytes of which are not exchangeable), includes a DOS/VSE operating system, a CICS remote processing program system, a DL/I database management system and various COPICS modules.

Increasing Productivity

The chief goal of the investment was to have the level of computer technology use in the information system used as a tool for leadership within enterprise guidance correspond to the technical level of the tools of production. It is well known that Raba has relatively modern technology; in a few areas it operates with complex manufacturing systems constituting a complete vertical structure. But the crucial question in exploiting the extraordinarily productive technologies used is what sort of conditions there are for production, what preparation there has been for production, how the time limits are developing and what sort of principle is being realized in scheduling. A suitably high quality computerized information system is indispensable for this. A significant increase in productivity can sometimes be achieved with up-to-date information, and this can also aid a more flexible and swifter accomodation to changing internal and foreign market needs.

The COPICS Modules

Putting the new machines into operation made it necessary to set up new computer centers in several places. In the course of realizing the investment they laid about 150 kilometers of data transmission cable within the city of Gyor. The remote processing links with sites outside the city (Budapest, Mosonmagyarovar, Szentgotthard, Koszeg, Sarvar, Papa, Kapuvar and Szombathely) are being created by constantly developing leased telephone line connections.

After the equipment was put into operation the chief task is adapting one after another the planning and implementing modules of the COPICS program package. With the aid of these all the data services connected with the material transformation process of production can be put on computer, from the arrival of orders to the shipping of finished goods. In March of this year, as the first step, they created the technical database constituting the common part of the COPICS modules. This contains approximately 500 million characters. As the second step they are introducing the implementing modules--an online inventory records system, recording and completion of operational tasks and a production report back system for the sites outside of Gyor. The third step will be introduction of the planning modules. The planning, the order planning and issuing and the goods receipt systems will go into regular operation in the first half year. They plan to introduce in the second half year the customer records system, the main program preparation module, needs planning, plant level fine programming and the costs and calculations system.

According to the plans a total of about 30 databases will be created and put into operation in 1986. The combined size of these is about 800 million characters. Despite the quite rigorous schedule it is the goal of the experts of the enterprise to convert from the earlier batched processing with minimum disturbance, preserving and making use of the experiences. They will stop the batched processing only if the online processing is able to take its place.

Self-Training

Raba has organized in an exemplary way the training of the some 4,000 workers who will be connected with computer technology at various levels. They organized internal study courses to provide the basic information and published self-training materials in large numbers of copies. One of the chief 1986 tasks of the training center established in 1985, with a capacity of 150 people, is computer technology training, using 8 classrooms, personal computers and video and sound equipment. In this way every interested worker will have direct contact with computers in the study courses which are being organized constantly.

The enterprise leadership expects from use of the modern new systems a constant reduction in production throughput times, an increase in general efficiency, a further improvement in discipline and organization, a reduction in stockpiles, a saving in live work and, ultimately, a change in attitude in every area of production.

8984
CSO: 2502/47

EAST EUROPE/COMPUTERS

HUNGARIAN COMPANIES USE SERVICES OF BRITISH HOSKYNS FIRM

Budapest SZAMITASTECHNIKA in Hungarian No 5, May 86 p 8

[Article by Jeffery Penny: "Hoskyns and Hungary"]

[Text] MAS

In December 1985 Hoskyns, the English computer technology service firm, had an exhibit in Hungary for the foremost representatives and leaders of the profession.

Hoskyns has been cooperating with Hungarian firms for 6 years already--the first customer, Medicor, was followed by the SZAMALK [Computer Technology Applications Enterprise], Videoton and Chinoin. They can count on other users too as the MAS-M program package of the firm is being sold in Hungary by the SZAMALK.

Hoskyns has committed itself to the Hungarian market. It makes its consulting services and systems organization and education experience available in Hungary. The new generation of its MAS products makes it possible for Hungarian firms to make use of the most modern Western organizational tools and methods.

The firm actively represents a policy of technology transfer, it provides tools by means of which the Hungarian user can become self-sufficient. Medicor and SZAMALK are examples of this, and of joint undertakings.

Hoskyns wants to make additional deals with Hungarian firms in the area of technology transfer and joint undertakings, combining its design experience with the expertise of Hungarian programmers.

In this article we describe the more important achievements of the cooperation between Hoskyns and the SZAMALK and between Hoskyns and Chinoin. In the future we will continue to inform our readers about other Hungarian users of the MAS-M program package and about further developments.

The SZAMALK

The Computer Technology Applications Enterprise deals with practically every area of computer technology use. It is a many-sided and large firm, with annual receipts of 1.5 billion forints. Export directed to the West makes up a substantial part of the activity of the firm.

The enterprise has a serious computer technology background. According to deputy director general Miklos Havass, however, the enterprise leadership recognized that it could satisfy its sales and marketing goals by designing entirely new applications software, but this solution would be too long, too expensive and very risky. Because of the size of the market the Hungarian enterprises had not yet prepared a program package so a program package taken over ready-made might serve better a fast start in a complex system sales strategy. They sought an applications system for mini and large computers. The SZAMALK learned of the Hoskyns firm and its products in connection with the MAS-M project of Medicor.

According to SZAMALK the chief factors in the decision for Hoskyns were the following: the firm had much experience in systems development, it used the most modern technology, it offered system support and training and it had references in Hungary.

Another important factor was that Hoskyns also transferred the source language version of the programs, and this made possible fast adoption and further development of the products.

The KSH [Central Statistics Office] provided 20 million forints for purchase of the MAS-M program package for distribution in the country. The SZAMALK spent another 10 million to develop the Hungarian version. This financial deal made it possible for Hungarian firms to purchase the MAS-M at one quarter of the English price recalculated into forints.

Naturally the development could not take place overnight. Hoskyns had to teach the SZAMALK to use the system, had to teach the teachers.

Even translating the documentation was a big job; the FSD (Functional System Design) alone makes up 22 volumes. The 11 modules used meant translating 7,000 pages. The translation was completed in April 1985, in close cooperation with the Hoskyns firm to guarantee that the translation took place on the basis of a full understanding of the English version. The translation took place in the following sequence: a dictionary of special terms, screens, documentation and finally error messages and protocols. The task was so great that the translation of messages and protocols is still taking place. The SZAMALK made basic preparations and even prepared 250 color slides as training aids.

In the meantime Econorg and Comporgan also undertook to distribute the program package and the number of end-users of the system is more than ten.

A new management planning module was developed as a further development of the program package at the SZAMALK, jointly with Medicor and Hoskyns. The SZAMALK did the programming work for this module--which takes care of rough production scheduling and the more important resource need determinations.

Development took one year and it is now ready. English distribution is the task of Hoskyns, which could mean capitalist foreign exchange income for Medicor and the SZAMALK.

Development of the production planning module is a good example of how mutual advantages can be derived by the pooling of the professional knowledge or capacities of two computer technology service enterprises. Hoskyns is striving to expand the cooperation further, possibly by institutionalizing the consulting role of Hoskyns and increasing the software development activity of the SZAMALK.

This contract is advantageous for both parties because there are more system organizers than programmers at Hoskyns. As is well known programmers are much sought after in England and the United States and their wages are high, so software development is especially expensive. Hungary has relatively many highly trained experts capable of developing software. This arrangement has great possibilities for the future.

Chinoin

Chinoin, the leading Hungarian pharmaceutical and chemical manufacturing enterprise, commissioned the Hoskyns firm to write a strategic study. The suggestions were of great import, they would lead Chinoin--which has been using computers since the 1960's--to the next generation of computers. In addition they would help Chinoin to deal with the raw material problems and assist the enterprise toward better utilization of the raw materials purchased for hard currency.

Chinoin was founded 73 years ago and today employs 5,000 people. The enterprise was early in the introduction of computer technology in research and development. The first applications system was an accounting system while another important application, even today, is aimed at research on new medicines.

Dr Janos Herman, chief of Chinoin's organization and computer technology main department, felt that computer technology was not exploited adequately in either enterprise guidance or manufacturing control. So it became obvious to the upper leadership of the enterprise that Chinoin, which conducted significant research and development, manufacturing and marketing activity, needed an information system which would support these activities. The present computer system is obsolete and its efficiency is decreasing. So it had to be replaced with an entirely new system. It became urgent to prepare a study which would review all the needs of the enterprise. They asked the Hoskyns firm to prepare the study. The role of the English firm was to give the

leadership of the enterprise advice and not necessarily to offer hardware or software. A new information system was needed to give the enterprise leadership quality information embracing all the activities of the enterprise--research and development, manufacturing and quality control--for decision making.

Why did Chinoin choose an English firm? In the opinion of Dr Janos Herman this was justified: "We felt that Hoskyns was a reliable firm which was capable of reviewing the work of Videoton and Medicor at first approach. We also looked at the present work of Hoskyns in England in connection with the Wellcome Foundation. Our enterprise has had close working contact with Wellcome for years in the joint manufacture of a few products.

"We found that there were many similarities between the two enterprises. Ready-made solution possibilities were offered for our problems connected with the manufacturing system--create a manufacturing system to order or buy a ready-made program package. We knew that it would be very expensive and would take very much effort and time if we developed the entire system ourselves. So we were looking for an enterprise which had a good manufacturing control system. We feel that the latest manufacturing control system of Hoskyns, the MAS-MCS, will solve our problems. Hoskyns has invested more than 100 man-years in the development of this product, and behind it stands a mass of experience which we do not have today."

With a data processing department employing 40 people, which includes data preparation, the enterprise does not have sufficient capacity to develop its own system. So they felt that it would be a more practical solution to link a custom system with ready-made systems.

A strategic study had to estimate the time and money which would have to be turned to an acceptable hardware and software solution. Hoskyns recommended that the entire system be renovated in a 5-year cycle.

The fact that many Chinoin products are manufactured for export presented the enterprise with two additional tasks. Its activity had to be harmonized with the GMP (Good Manufacturing Practice) requirements of other countries, while being active in an export environment in which competition is increasingly sharp.

Chinoin already has a well developed export base. About 70 percent of all its pharmaceutical manufacture is exported to East or West (about 24 percent to the West and about 46 percent to the CEMA market), and the value of its export to 72 countries comes to 5-6 billion forints per year.

The FDA (Food and Drug Administration, United States), the DHSS (Department of Health and Social Services, United Kingdom) and the OGYI [possibly National Pharmaceuticals Institute] in Hungary issue strict but differing rules which the pharmaceutical manufacturing enterprises must adhere to. In addition, the inspectors of those countries to which the manufacturers ship visit the countries of the manufacturing enterprises in order to look over the manufacturing environment and conditions. These people expect that the products will be produced with high level documentation and organizational

practice and if any problem arises it is absolutely necessary for the manufacturing enterprise to provide detailed information about every batch made, and the information requested can also extend to products which were manufactured 5 years earlier. The procedure is called "batch tracking."

For this to be successful large volumes of data must be collected and stored in connection with raw materials and regarding the intermediate stages of manufacture, quality control, methods of testing, any problems which arose in the meantime and all parameters of the final product. It is fundamental that Chinoin put into operation a computer system which can handle large volumes of information.

The Hoskyns personnel have completed the on-the-spot study at Chinoin. They have prepared the so-called interim report and the entire plan was reviewed at the beginning of 1986. The recommendations involve a new enterprise technical strategy, a comprehensive educational and training program, a collection of applications and a plan regarding how to support the present system during the time of conversion.

The 5-year plan also may extend to the newest manufacturing control software product of the Hoskyns firm, MAS-MCS. A complete renovation of the present system means that Chinoin will not need a larger reorganization within the next 20 years. The finances for the investment on computer technology are ensured. This strategy will take the enterprise into the twentyfirst century.

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EAST EUROPE/COMPUTERS

VOLAN TRANSPORT USING COMPUTER MANAGEMENT OF ASSIGNMENTS

Budapest SZAMITASTECHNIKA in Hungarian No 5, May 86 p 14

[Unsigned note: "Computer Technology at Volan"]

[Text] Two fairly large capacity computers, 25 picture screen terminals located in the various departments, a dozen small computers and a computer technology staff of 30 people are helping guidance of the 1,500 vehicles and coordination of 100 million trips per year at the Tisza Volan Enterprise in Szeged.

First of all they used computer technology to coordinate 3,000 local, interurban and long distance trips per day and to work out schedules. Seventeen other Volan enterprises have taken over their computerized scheduling system and seven others have taken over their traffic organization system. Last year they earned 8 million forints from development and sale of computer programs. Computer technology also has a large role in the technical development of the enterprise. They have developed microcomputerized diagnostic instruments to protect the large autobus and truck stock and preserve its technical condition and they have furnished their central repair shop in Szeged with them.

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IKARUS BUS COMPANY ADOPTS COMPUTERIZED PRODUCTION CONTROL SYSTEM

Budapest SZAMITASTECHNIKA in Hungarian No 5, May 86 p 14

[Unsigned note: "Terminals in the Plants"]

[Text] As a result of almost 2 years of preparatory work the computerized production control system of Ikarus began experimental operation with "live" data at the beginning of the year. The system aids better scheduled production in the area of parts manufacture, fitting it better to the production of the final products. The computerized operational production control system which was put into operation will help ease one of the most burning problems of the factory, parts supply. The DIMACS (Dialog Manufacturing Control System) manufacturing control system developed for an ES 1011 computer sees to it that parts manufacture can follow vehicle manufacture in a current way, that the necessary assortment of parts should be available in time for the given model and series size. One of the virtues of the system is that it also "knows" the current changes in technological documentation and orders. Ikarus purchased the DIMACS from Videoton, where it has worked effectively for years. The Computer Technology Applications Enterprise adapted it to parts manufacture at Ikarus. The operational production control system will be introduced in two steps. Experimental operation of DIMACS I, which relies on three subsystems, can start now as the first phase. They are seeing the usefulness of the computer now in manufacturing preparation, in decision preparation and in direct production control.

The system consists of exclusively domestic hardware and software. The Prague software house of Videoton developed the data management basic system and the base software also is a Videoton product.

It appears that the development, which cost several million forints, is a paying one and will pay for itself quickly. By putting the computer into operation there are prospects for a 5-10 percent increase in productive capacity in Ikarus' manufacture of its own parts, an operation coming to 150-200 million forints per year. This in itself could bring an improvement in results of 7.5-20 million forints.

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EAST EUROPE/COMPUTERS

BUDAPEST TECHNICAL UNIVERSITY INITIATES COURSE IN INFORMATICS

Budapest SZAMITASTECHNIKA in Hungarian No 5, May 86 p 16

[Article by A. K.: "New Section Planned at BME"]

[Text] Beginning with the second semester of school year 1986-1987 the Electrical Engineering School of the BME [Budapest Technical University] will start an informatics section. With the creation of this new section, the fifth, the enrollment of the Electrical Engineering School will not increase. According to the present thinking they will start four study groups in the informatics section for a total enrollment of about 50-60 students.

Program Designing--and Attitude

In the informatics section they plan to train electrical engineers whose work is primarily electronization, creating program products for electronic systems and services, and a creative knowledge and application of the research, designing, development, manufacturing and quality control cultures needed to develop such products. The task of the engineers graduating here will be primarily mastering the methods of the design of programs and of information processing, but they must also acquire an electrical engineering attitude, basic information, receptivity and ability to cooperate in regard to the electronic system using the program products. By starting the section the BME intends to come up to those training endeavours which can be found even internationally with which computer technology training is taking place in the electrical engineering schools and informatics schools of leading industrial countries or in informatics programs combined with electrical engineering instruction.

Place and Goal

The training of program designing mathematicians has been taking place in our country for years in the science universities in Budapest, Szeged and Debrecen. The primary task of these, which can be well distinguished from the training planned at the BME, is to provide program designing replacements in work areas separable from direct industrial production. They intend to create the informatics section within the Electrical Engineering School in order to methodically educate replacements for computer technology experts who require an electrical engineering background.

The emphasis of the education in the new section will be shifted somewhat compared to the common educational emphases of the other sections of the school. It will shift from physics and electronics in the direction of program design and information processing. Beginning with the first semester one will find subjects connected with informatics. These will include, for example, programming and problem solution (computer technology fundamentals, programming in a high level language, programming environments, problem solution with a computer, etc.), fundamentals of program design, digital techniques, system programming (methods of automatic program generation, operating systems, database management, theory of parallel programming, computer networks) and informatics systems and their design (for example, the basic techniques for expert systems).

As a supplement to the material possibilities of the BME the Computer Technology Research Institute and the Innovation Center (of the SZKI [Computer Technology Coordination Institute]) will donate 20 modern Proper-16W personal computers to the university. Each computer has a 27 M byte Winchester disk unit, one floppy disk unit and one printer. The SZKI will be included in the teaching in the new section by way of its experts.

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EAST EUROPE/COMPUTERS

HUNGARIAN ELECTRONICS, COMPUTER PROGRAMS CONTINUE

AU281247 Budapest NEPSZABADSAG in Hungarian 16 May 86 p 5

[MTI report: "The Use of Electronics in Hungary Will Be Accelerated--Press Conference of the National Technological Development Commission in Parliament"]

[Text] A press conference on the utilization of electronics in Hungary was held in parliament on 15 May. Laszlo Pal, main department head of the National Technological Development Commission, said that the process of applying various electronic solutions would increase in the period of the Seventh Five-Year Plan and electronics would become an important production factor in an increasing number of sectors of economic life. The continuation of the central computer technology development program, the electronic economic development program, and the related research and development programs will also contribute to the introduction and spread of electronics.

The implementation of the computerization program started 15 years ago and considerable results have since been achieved in developing installations, expanding exports, and in the training of experts. Today, the computer industry taken in a wider sense if manufacturing products worth approximately 12 billion forints annually, and three-quarters of these products are exported. Another achievement is that, while there were only eighty computers in operation in Hungary 15 years ago and the stock was made up of sixty different types of installations, the enterprises today, are operating 2,000 mostly universal computers and another 20,000 micro-computers, and there are also 80-85,000 individual home computers in the country. As a result of the development of domestic production and the cooperation of socialist countries, the domestic computer stock has become more uniform. While the Hungarian computer industry and application technology have generally developed considerably, the development of data processing--also part of this industrial sector--has fallen behind the desired level.

Laszlo Pal then spoke about the great efforts made by all the CEMA countries in order to introduce electronic solutions on a wide scale and to ensure their social and economic utilization. Thus, the development of electronics and automation are of prime importance in the complex program of the socailist economic community.

In harmony with the long-term plans of the socialist community, in Hungary too a central program is facilitating the production and development of electronic parts and their utilization. Soon a plan will be worked out for increasing the production of such components for the years following 1987. Another program seeks to create a social atmosphere and economic conditions that will facilitate the introduction and utilization of electronics.

Several research and development programs in the Seventh 5-Year Plan period are also contributing to the implementation of the electronics programs. These include component research projects and the development of the control units and sensing devices necessary for precision instruments, and of electronic components used in computer technology and telecommunications.

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EAST EUROPE/COMPUTERS

GDR COMPUTER ACCESS TO WORLDWIDE PATENT INFORMATION

East Berlin INFORMATIK in German No 2, 86 pp 64-65

[Article by Juergen Zimdars, Patent and Invention Office of the GDR: "Data of the World Patent Fund"]

[Text] In the new period of realization of the economic strategy of our party, the high pace of the renewal process of the products, product structure, technologies and production processes has matured to a decisive central issue through the extensive use of the latest findings of science and technology. Central to this issue are scientific/technical solutions of a top-notch level, i.e. the level of inventions. The decisions to be made must be supported by solid and well-founded analytical-conceptional foundations. That requires the assessment of the output development of the combines, measured on the highest level of the world, an exact analysis of the scientific-technical development in the world, the activities of leading concerns, firms and specialists, as well as market trends and a prognostic assessment of the worlwide trends and tendencies in science and technology.

The bibliographic and statistical data of the World Patent Fund are currently made available computerized for the national economy of the GDR by the Patent and Invention Office (AfEP) on the following:

- World Patent Service, including a patent right information reference (SIV) on technical profiles and a patent right information reference on the names of applicants/holders/inventors,

- International Patent Statistics,

- Patent family service.

The data base for these services is formed by the published invention patent rights of 50 countries, the regional fund of the (West) European Patent Agreement and the Patent Cooperation Treaty at the extent of the magnetic tape deliveries of the international system of patent information of the member states of the Council of Mutual Economic Aid (CMEA). Thus, over 90 percent of all inventions, for which patent applications have been filed in the world, are covered. The computer-assisted inquires performed by the Patent and Invention Office, are, through their manifold linkage possibilities with each

other, but also by conventional inquires, important aids for an effective evaluation of the more than 900,000 specifications of inventions annually published in the world.

In the following, a report shall be given as to how the work in research and development can be made still more effective by utilizing the bibliographic and statistical data of the World Patent Fund.

1. Utilization of the bibliographic data of the World Patent Fund for the actualization of inquires on the state of the art.

The bibliographic and legally relevant data on the specifications of inventions identified in the World Patent Service, such as title, notation(s) of the international patent class, names of applicants/holders and inventors, application and publication dates, priority data, as well as data on analogous patents already published permit the following:

- keeping constantly current information on changes in the state of the art and on newly emerging competitors/ coapplicants/specialists,

- streamlined monitoring of patent right activities of known competitors, coapplicants, and specialists,

- a general view of the territorial scope of protection for proven inventions,

- the utilization of analogous protective rights for a patent family most easily developed from a linguistic standpoint,

- an overview of the development of the legal state of patent rights of inventions,

- the efficient assembly of an enterprise information fund.

Inquires conducted in the combines and scientific/technical facilities on the state of the art can be most effectively continued by way of the World Patent Service up to the time of conclusion of the respective research topics. The World Patent Service in conjunction with report information from the GDR and USSR available in the enterprise funds has proven its value for the required monitoring of the international patent happening as a means of signal information contributing also to overcoming the language barrier by a statement on analogous patent rights. The work with the World Patent Service has brought the best results in those combines which organized the comprehensive utilization of the international research and patent happening directly with personnel from research and development. The availability of bibliographic data of the World Patent Service in form of an A-6 file card permits efficient inclusion in retrospective report and full text data banks.

As a result, it becomes possible to increase the informative power of the enterprise data banks, to register the specifications of inventions not existing in the own fund, and to optimize the inquiry in the reports and full

texts by limiting it to the analogous patent rights easiest developed from a linguistic point of view. Research and development facilities, which already have the prerequisites for an own computer-oriented evaluation of the information of the World Patent Service, receive magnetic tapes preselected by the Patent and Invention Office for the assembly of patent data banks of specific fields. The necessary programs can also be made available by the Patent and Invention Office. The bibliographic order inquires carried out by the Patent and Invention Office on the basis of the official publications of the Patent Offices and the Patent Family Service have already proven their worth for many years in the optimizing of retrospective topical inquires. Apart from the continuous monitoring of topical profiles and names by way of the World Patent Service, the Patent and Invention Office also assures the monitoring of patent families and the legal existence of patent rights of inventions. The Patent and Invention Office is thus able of making all required evaluations on the bibliographic and statistical data of patent rights of inventions available to the national economy.

2. Possibilities of supporting the strategic work in science and technology by information obtained from and about patents.

In the forefront of the development of improvement and research concepts, the systematic analysis of the international patent activity and the derivation of the determining development trends are of special importance as a basis for decisions on the own scientific/technical development trends of the combines. The level of the international progress in findings is the irrefutable standard for the assessment of the new and further development of products, processes and technologies. A number of patent information aids of the Patent and Invention Office are available for the analysis of the international patent happening. Of particular importance in this respects is the International Patent Statistics which makes available important information on the dynamics of the development, the application activities of the most important industrial nations, and on significant patent rights for inventions in the field to be exploited. The analysis of the happening in international patents is a multi-stage evaluation process the work stages of which are described hereafter.

First Work Stage

The analysis should begin with a determination of the general worldwide trends in the international patent happening in the field to be exploited. At first, the dynamics of the development in the individual partial areas is studied by an evaluation of the ten-year table of the "International Patent Statistics" of the Patent and Invention Office, based on the units of order of the international patent classification. By evaluation of time series a determination is made on which fields continue to progress dynamically and in which field the development is stagnating.

Second Work Stage

After an assessment of the general worldwide trends a determination is made of the countries with a decisive influence on the international development

by utilizing the number of priority patent rights in the countries with the largest number of publications. By including subsequent applications, the market-political intentions of the concerns of these countries can be recognized during the utilization of the publication matrices of the "International Patent Statistics" by an analysis of their application strategy.

Third Work Stage

After identifying the countries determining the highest world standard, establishment of the most significant inventions in the field to be analyzed represents an additional analytical step. The basis for it is formed by utilizing the information on the inventions with the greatest territorial range of protection, which are available for all units of order of the international patent classification and are arranged according to the names of the concerns/firms/enterprises. This makes possible the selection of the especially important inventions both from a technical and market-political aspect (results of the competition).

Fourth Work Stage

To deepen the findings obtained by the utilization of the statistical informations, it is necessary to conduct an inquiry on the state of the art in those countries whose patent rights embody as a matter of priority the advanced international state of the art. As a rule, this inquiry is carried out in the own information funds. In this topical inquiry which is based on the order units of the international patent classification, the ascertainment of the firms and concerns dominating the market and of the specialists excelling in this field must be carried forward, in addition to the dispute with the international state of the art.

Fifth Work Stage

After concluding the inquiry on the state of the art, a decision must be made on the extent to which the patent right activities of the firms and companies dominating the market are to be investigated further by selected specialists through retrospective name searches in the patent publications or supervisions of the World Patent Service. The relevant specifications of inventions hereby determined are to be evaluated in the report funds. Concern-related analyses of the patent literature permit making strategic statements, in particular with respect to the development trends and market intentions of the principal competitors. Since the renewal processes are becoming constantly shorter on the international level, a belated recognition of new trends and tendencies on the world market will lead to economic losses. The close connection between patent applications and the market-political utilization of the acquired patent rights permits the drawing of conclusions on the patent right activities of the main competitors. An evaluation of the most important inventions of the competition and their patent families for our own research work specifies in detail the leeway for own developments and the patent-free areas remaining for export. A solid analysis of the activities of the main competitors requires, however, also

knowledge of the respective interests and interlocking relations of the concerns, as well as their research-and patent policy. Such a systematic work in the combine for the evaluation of the international patent happenings and their development provides a solid basis of findings for a qualified strategic work in science and technology.

3. Creation of a continuous information system on the international patent happening corresponding to a differentiated demand.

As a result of the regular information obtained on the current patent happening in the world, directors and assistants in research and development are enabled to pursue the development of the international state of the art in their fields and to recognize by joint evaluation with other scientific-technical informations the determining trends in what is happening in international research. By means of this basis of recognition it is possible to constantly actualize and state more precisely the problems in research and development, and to react specifically in the technical and patent right work to new developments. A differentiation must be made between the information for the management and planning of the combines and the information for the research and development collectives, as well as the offices for patent rights. For the management and planning of the combines it is necessary to supplement the information from patents regularly and systematically for the strategic work by condensed information on the specifications of inventions newly published in the world. For the processing of this information according to technical, patent right and economic aspects, the services of the International Patent Statistics, the World Patent Service, and the departmental periodicals of the Patent and Invention Office constitute efficient aides. The possibilities for a continuing subject-related information of the research and development collectives and of the offices for patent rights on the current happenings in the patent area are illustrated in the following. Beginning with the opening defense of a specification up to the introduction of the new technical solution into production, the continuous subject-related information is to be organized according to variable criteria of utilization. Departing from the significance and scope, the following forms of information, which are to be realized parallel in time, but delimited topically, are held to be required.

Information on Technical Profiles

On the basis of a utilization of the World Patent Service based on the relevant units of order of the international patent classification in the countries determining the highest world standard and the countries targeted for export, the current information on the further development of the international state of the art is organized most effectively. The signal data of the World Patent Service are to be supplemented by the short versions of the specifications, subject to the availability of the report periodicals of the Patent and Invention Office and its cooperation partners. The bringing together of the references of the World Patent Service in card file format with the reports in a common reference storage has proven its worth well after the current utilization.

Information on the Patent Right-Political Activities of Applicants Holders Inventors

The worldwide selective dissemination of information to the names of applicants/holders/inventors, which became possible by the World Patent Service, assures most effectively and comprehensively current information on the patent right-political activities of the market leaders, as well as of selected competitors, coapplicants and specialists. To be recommended in case of invention patent rights important for own solutions is, after current evaluation, the storage in a competition file with the inclusion of the abbreviated versions of the specifications.

Information on the Development of the Territorial Scope of Protection of Selected Inventions

For the significant patent rights of inventions determined in the course of the realization of specifications, an evaluation of the possibilities of subsequent use or of the economic utilization of own technical solutions is frequently dependent on the territorial scope of protection. With the supervision of the worldwide published patent rights for selected inventions via the Patent Family Service of the Patent and Invention Office, the bases were created for well-founded decisions on the reaction to the publication of internationally significant or disturbing patent rights.

Information on the Development of the Existing Rights of Selected Patent Rights

The supervision of the existing rights of selected patent rights for inventions by utilization of the Existing Rights Service of the Patent and Invention Office is required both for the reacting to infringements of own patent rights in due time and also for short-term information on when selected patent rights belong to the free state of the art. Especially in conjunction with licensing negotiations, the current existing rights of patent rights of inventions are of great importance.

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EAST EUROPE/FACTORY AUTOMATION

PRODUCTS DEVELOPED BY CSSR AUTOMATION RESEARCH INSTITUTE

Prague TECHNICKY TYDENIK in Czech No 5, 28 Jan 86 p 3

[Article by (jb): "Automation Requires Creativity"]

[Text] As already its name indicates, the task of the Automation Research Institute (VUAP) in Prague is to prepare new automation devices. Which means that the institute develops, designs, builds and tests a prototype, and then transfers it to the manufacturer, together with the documentation. Unlike many other inventors, however, it does not have to go to the trouble of finding a manufacturer. Namely, the Automation Research Institute is a special-purpose organization of the Automation and Computer Technology Works concern, the enterprises of which are striving to perfect their products. The automation devices that the concern enterprises produce are then used for technological process control, in practically every branch of our economy.

Recent Past

In the past, automation equipment was developed for individual customers, to their specifications. Which of course meant that a large number of different automation devices had to be developed and then produced. Already in the 1960's, therefore, the Automation Research Institute developed the URS universal control system. It was a modular system: i.e., its basic components were always the same, but assembled and supplemented differently, in accordance with the customer's requirements. This was a great advantage for research, which was able to concentrate on these basic components and perfect their development. But even greater was the advantage that the manufacturer derived: he was able to series-produce the components. The equipment that the customer received was of better quality, and spare parts for it were more readily available.

The customers' requirements, of course, gradualy increased. The components, too, were perfected. In particular, integrated circuits were developed with ever-larger scales of integration, and mini- and microcomputers (microprocessors) appeared. In the 1970's, therefore, staff members of the institute developed a second-generation URS universal control system. It was successful, but progress marched on. And thus, under the 7th Five-Year Plan, the Automation Research Institute developed several additional types of universal control systems. What kind where they?

MIKROSAT and the Metro, DERIS and NURIS

MIKROSAT is a new control system with an 8080 microprocessor, capable of handling words that are eight units of information (or bits) long. Modules of this system make up, among other things, the automatic control system for the Prague metro's B line, which was placed in operation last year. But equipment from the Automation Research Institute is being used on the other lines of our metro as well. For example, it is enough for the motorman to press the "Run" button, and the so-called destination braking controller takes over. It lets the metro train accelerate as fast as possible with the least power consumption, run a stretch, and then brake automatically at the next station. The speed during the run adjusts automatically to the track gradients, curves, and passenger loads of the cars.

The Automation Research Institute has developed also the DERIS decentralized control system. Namely, in the case of complex systems, it is not advantageous to control everything centrally. It may be better to give the central computer overall control of a program, but to assign partial tasks to its slave computers, each of which has its own slave controllers (in the control system there are actually three levels of control). If in the DERIS system the central computer fails, its "authority" is assumed by one of the slave computers. If one of the slave computers fails, the operations controller reassigns its tasks to another slave computer. Thus a breakdown of the entire system is practically ruled out. The DERIS system is already serving well some of our thermal power plants, but mostly it will be used in our nuclear power plants and perhaps also in foreign ones.

And thirdly: The machine tools built in Czechoslovakia are usually of very good quality. But if they are to better satisfy the requirements of our enterprises and be more readily marketable abroad, it is essential to equip them with better automatic numerical control. Therefore the Automation Research Institute has developed a numerical control system, called the NURIS, for a wide range of machine tools. It has proven suitable in practice.

Central Element Alone Not Enough

The heart of any automatic control system is its central element, usually a mini- or microcomputer. To be able to control properly, of course, it needs objective information, which is supplied by sensors. Staff members at the Automation Research Institute have developed a number of perfect sensors for detecting pressure, temperature, the levels of liquids, loose or lumpy materials (coal, for example), the displacement or rotation of parts, etc.

The central element's decisions must be implemented, by a so-called actuating element. With the help of servomotors, electric magnets, switches or gate valves, it regulates the flow of a liquid, a machine's rotations, the temperature, pressure, etc. The institute has developed also new actuating elements that are able to operate even under the most adverse conditions.

These new sensors and actuating elements are already functioning well in hydroelectric, thermal, and nuclear power plants, in engineering, metallurgical, chemical and food-industry plants, in agriculture, at stone quarries (for example, in the silos and bins), and at waterworks. They can be adapted for use in practically any industry.

The Automation Research Institute also writes programs for the automated systems. Thus the customer gets not only the hardware for the automatic control system, but also" custom-tailored" programs that are ready to run. Finally, a separate department of the institute develops specialized automation equipment to the customers' specifications. For example, equipment has been designed that controls the operation of hydroelectric power plants, in our country, the German Democratic Republic, Mexico and elsewhere.

Inventors Help

Inventors and innovators are contributing to the success of the equipment developed at the Automation Research Institute. In 1984, for example, staff members of the institute filed 29 applications for certificates of invention; of the 29 inventions, 22 have been realized. Society's gain from working the inventions amounts to several million korunas a year. It is difficult to compute the exact amount, because only a part of this gain is derived at the institute itself. The bulk of society's gain is realized in the production of new equipment at the concern's enterprises, and also at the users of the new equipment.

Interesting, for example, is the invention of the team headed by Engineer Jan Hajic. It concerns only one element of an automatic control system, but a very important and versatile element. The microcomputer, its input (the sensors, for example) and output (e.g., the servomotors) all have different voltages. How to solve the exchange of analog information between them, without any disturbance due to the different voltages? Various opto-separators were used for this purpose. However, they were affected by the ambient temperature, their operation got worse with age, and they were not sufficiently accurate even when new. Therefore, the team under Engineer Hajic invented a linear separator that is accurate, not affected by heat, and has a practically unlimited service life. It comes in two types: as the DBA card, and the VUB 044 minimodule. The Automation Research Institute will supply the documentation for the two types, upon request.

For Ourselves and Mexico

Our large hydroelectric power plants are connected to the power grid only during periods of peak load. But then they have to be connected very quickly, to prevent overloading the power system. And the water turbines that drive the generators must maintain a constant speed of rotation, so that the alternating current's frequency will not change. Thus when the load increases, the flow of water to the turbines must be increased immediately. All this was done up to now by an analog controller. But the team under Engineer Jiri Lamac, CSc, invented a way to use a numeric controller for this purpose. It is able to connect a hydroelectric power plant to the grid much faster, and to regulate the turbines' speed of rotation far more accurately. The new controller is already being used in Czechoslovakia, and at two power plants in Mexico as well.

Or another example: A microcomputer needs a peripheral to control a machine tool. The peripheral supplies the computer input data from the sensors, and transmits the computer's decisions to the actuating elements: to the servos, for example. Up to now, each type of machine tool had its own peripheral.

Moreover, the control system of the machine tool had to be adjusted mechanically whenever the machine tool switched to machining a different product. Now the team headed by Engineer Pravomil Lang has invented a peripheral without these drawbacks. The peripheral can be attached to the automatic control systems of various machine tools. And when the machine tool is assigned new production, it is enough to change only the so-called address cards in its control program.

There are many such creative teams at the Automation Research Institute, with inventions to their credit. The team headed by Engineer Karel Janu, for example, has already obtained certificates of invention for scores of inventions. Conditions conducive to creative work produce successful results.

PHOTO CAPTIONS

1. p 3. An invention of the institute's staff, the 8080 simple analyzer is used to diagnose systems controlled by an 8080 microcomputer.

2. p 3. Raster-scan color graphics display, developed at the Automation Research Institute, is able to display simultaneously alphanumeric data and graphics, on an ordinary color TV monitor. It is protected by several certificates of invention.

1014
CSO: 2402/16

REVITALIZATION PROGRAM OF TUNGSRAM WORKS

Budapest NEPSZABADSAG in Hungarian 19 Apr 86 p 8

[Interview by Katalin Bossanyi with various members of Tungsram Inc.'s management, including Andras Gabor, executive director, Attila Kis, managing director, Jozsef Palosi, director of technology, Laszlo Horvath, department chief, and Laszlo Odor, head of the development department: "Tungsram Strategy for Renewal"; date of interview not given]

[Text] After a three-year long wait, the financial affairs of the Tungsram Corporation again had to be reorganized. The State Planning Office determined that the internationally renowned large enterprise lately had improved its enterprisal management to a significant degree, but it still does not produce sufficient profits to counterbalance amortization of capital and interest obligations--accrued in part due to regulatory changes--in the amount of 3.4 billion forints covering earlier investments. Therefore, in the hope of maintaining the long-range competitiveness, the government released the Tungsram Corporation from paying the major part of its debts.

This significant financial assistance may initiate a new chapter in the life of the large enterprise, one of selective revitalization based on concentrated development. The stability of management practices is a precondition for this. Andras Gabor was named not long ago to head the Tungsram Corporation; earlier he was one of the deputies to the minister of industry and because of this he has a broad overview of the present and future situation of the large enterprise. That is why I asked him what his view was of the following: Had the enterprise done everything it could in the interest of long-range development during the period between the two settlements of its financial affairs?

Uncovered Reserves

"During recent years the management at Tungsram had initiated a comprehensive reorganization program. Among other things, they modernized the internal supervisory hierarchy and organization of the firm, reduced the number of employees by about 2,600, discontinued uneconomic activities at home and abroad, sold unutilized plant sites and equipment, and significantly reduced production costs. Of course, these are the resources that can be easily and quickly revealed, but--in my view--they hardly had opportunities to initiate

other measures. The extra profits resulting from internal efforts have been almost immediately negated by the changes in regulations, the growth of interest burden, and the global development of prices. Undoubtedly, the efficiency and export capability of the enterprise increased at a slower rate than expected, and technological and development activities have not gained sufficient momentum either. Both of our problems have an identical root: In order to change and revitalize, we must introduce development measures too! Yet, in the recent past this enterprise did not even have enough money to implement development measures to maintain the status quo, while the modernization completed in the mid 1970s is already behind the times. Thus, I consider the present central decision important for the reason that, even though it creates strict conditions, it will enable us to achieve credit-worthiness once again."

What are the conditions for growth?

"Management practices that are much more efficient, enterprising, and open than the present one. It is realistic to expect our sales receipts to increase by 30-35 percent by 1990, and if we can improve our effectiveness by 50 percent, we can also reduce our payroll by 15 percent. Our profits can double, based on a 30 percent growth in Western and 25 percent growth in socialist exports."

At this point it is worth stopping for a moment. After all, when it comes to the machine industry, Tungsram is the second largest exporter--right behind the Raba Works--and it is first in the net production of hard currency. Three years ago, the value of our Western export was nearly 100 million dollars, but by last year it fell to 88 million dollars. The background of this is explained by Attila Kis, the managing director of the firm:

"Previously our firm has received much valid criticism, according to which our exporting efforts are not economical enough. Our present volume of export to the West equals the 1983 level in quantity and in forints, but--due to the changed exchange rate--it is worth less in dollars. At the same time, we have discontinued the export of less economically feasible products and several of our activities abroad, and replaced these with new, more valuable lighting equipment. Thus, our present export activities are much more economical in their structure than the earlier ones. And, even though we also wish to increase the volume of our export, in the long run the stability of management practices can be based only on the profitability of our foreign sales. Not only this enterprise, but--I believe--the entire national economy would benefit from this."

The most important links in the chain of renewal are the speeding up of technological development, and the selective modernization of the product profile and production technology. Efforts in these areas are outlined by Jozsef Palosi, the director of technology:

Modern Products

"In the near future, we wish to concentrate our intellectual and material resources in three large areas. Within our traditional profile--the

production of lighting equipment--we will increase the share of the more valuable halogen- and sodium-lamps, as well as that of compact tubular lighting elements. We will close our developmental gaps in the production and exporting of energy-efficient tubular lighting elements, and in the area of spotlights we will convert to the use of tempered glass, which guarantees more reliable operation. In addition, we will discontinue manufacturing traditional items (either because they are uneconomical or because their use is limited) that make up about one or two percent of our yearly production. We have also become active in the development and manufacturing of industrial electronics. This generational transformation is connected both to the electronization of our own production efforts in vacuum-technology equipment, and to our program in robot technology. At this time, these items make up only about 5-6 percent of our production, but by 1990 this could be 20 percent; what is more, if negotiations with our Japanese partners are successful, it can even reach 25 percent. At the same time, by synchronizing our efforts with global trends, we further broaden our product profile. For example, we are involved in medical and industrial laser technology, microelectronics, the manufacturing of instrumentation and display equipment, and the development of theatrical stage technologies. Among other items, this year we are delivering our first microprocessor-guided lighting control system to the Kiev theater."

But what portion of the new development results is already visible? In the experimental production shop, department chief Laszlo Horvath introduces the new, microprocessor-equipped, computer-guided line that produces tubular lighting elements. The skillful equipment is able to produce 2,000 tubular lighting elements per hour: without being touched by human hands, it automatically assembles the glass parts into lighting elements, checking every part of the process separately, correcting any mistakes it comes across, and wrapping only those products that are proven to be of first quality. The prototype has only now been finished; it will be installed in the Vac plant of the firm, but our Soviet partners have already ordered 19 similar lines, and firms from Iraq and Egypt also are interested.

Even more illustrative of Tungsram's promising technological renewal is the guidance system of the Beta robot, developed for the Soviet automobile industry. Based on Soviet information, the development of the universal guidance system is a genuine Hungarian innovation. During my visit to the firm, Laszlo Odor, the head of the development department, told me that the demanding work was accomplished within a short period, and the system operated in an excellent manner throughout the 2,000-hour trial period. The robot will be primarily used for welding, but it is also suitable for assembly and loading work; in other words, this Hungarian guiding system will replace Western equipment which has been prohibited from being exported to socialist countries. This year already 70 such guidance systems will be delivered to the Soviet Union, and there are orders for more than 1,000 to be delivered by 1990. The deal is very profitable; each of these guidance systems costs nearly a million forints!

"During the next few years we are planning to use 5-600 million forints worth of credit, in part from domestic banks, and in part from the World Bank. Unless there will be other changes in the regulations, our growing profits

will provide steady coverage for repaying these loans," explains executive director Andras Gabor. "We will use these loans to modernize our equipment, and broaden our economic capacities by utilizing imported machinery. Using this method, we can soon put into production a very high capacity Japanese halogen lamp manufacturing system in our Budapest plant, while we plan to enlarge the manufacturing of compact tubular lighting units in our plant in Vienna. When it comes to the methods of technological transformation, we can rely on our own machine production and auxiliary automatization; alternately, we can sell a few traditional manufacturing systems to the developing nations and replace them with more modern ones."

Are there any opportunities for attracting new operational capital or the formation of multi-national enterprises?

"Of course! We have reached quite favorable agreements with several firms, and we are now negotiating about further possibilities. In Australia we established a multi-national enterprise, in England a joint enterprise for the commercial distribution of lighting fixtures; and we are now founding an affiliate in Japan for the sale of automobile lights. In France we also improved our position by re-purchasing the Tungsram brand name from the Sylvania firm. Our market position is favorable: The prognoses indicate a 5 percent growth for us during this year. Our prices appear to be competitive, and we have increased our sales activities in our traditional markets, such as China and India. It is especially advantageous that we can deliver technology, machinery, and lighting parts to these countries, and we can also participate in their industrialization programs. In my judgment, our economic expansion is more severely hindered by problems of capital re-deployment and entrepreneurship, resulting from domestic practices, than by market conditions.

Of course, the elimination of these hindrances is not the internal affair of Tungsram, but depends instead on how well we can utilize the still existing influence of our only multi-national enterprise on market and technological development. After all, in spite of its present managerial problems, Tungsram still produces 4 percent of the world's lighting equipment. This is a significant presence on the market, and it holds the promise for further expansion."

As A Genuine Corporation

Obviously, the Hungarian large enterprise could also strengthen its competitiveness if it operated under conditions similar to those of its great competitors--such as Siemens, Phillips, or Osram. And since the foreign firms all operate as multi-national corporations, a configuration beneficial for profitable investments and rapid capital transfer, Hungary's National Planning Committee recently authorized the management of Tungsram to investigate the possibilities and propose the methods for turning their large enterprise into a genuine corporation.

After all, Tungsram already has 12 affiliates all over the world: whether these are manufacturing or commercial undertakings, they are mostly Hungarian-owned and operate as corporations. Of course, formally Tungsram of Hungary is

also a 'Corporation,' but its management circumstances--including its taxation and investment opportunities--are quite different from its competitors. To put it bluntly, it operates under more restrictions. In the long run, the most desirable course would be to become international, but it is noticeable that Tungsram can only start on that course in a gradual manner. First its domestic activities should be reorganized into a nationally supervised corporation: the conditions of the firm, the imminent reform of the banking system, and the new laws concerning associations all appear favorable for that kind of change. Experience abroad indicates that it would be advisable to create a holding company superseding the two aspects--domestic and foreign--of the firm. Through this method, Tungsram could end its reliance on state money and could participate more effectively in the international manufacturing specialization, while its own market presence could also be improved.

12588
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FRG REVIEW OF GDR BOOKS ON MICROELECTRONICS

Cologne DEUTSCHLAND ARCHIV in German Vol 19, No 4, Apr 86 (signed to press 25 Mar 86) pp 405-407

[Article by Volker Gransow: "Real Socialism and the Furies of Progress"]

[Text] Joachim Dubrau/Werner Netzschwitz, "Mikroelektronik: Wie veraendert sie unser Leben?"(Microelectronics: How is it Changing Our Lives?) Dietz Verlag, Berlin (East) 1983, 200 pp 3.50 Marks.

Manfred Hütter/Eberhard Jobst et al.,"Mikroelektronik und Gesellschaft" (Microelectronics and Society), Akademie Verlag, Berlin (East) 1984, 120 pp 16 Marks.

Wolfgang Marschall/Klaus Steinitz (Editors), "Schlüsseltechnologie Mikroelektronik" (Microelectronics as a key technology), Dietz Verlag, Berlin (East) 1985, 236 pp 8.90 Marks.

In the GDR economic plan for 1985, the largest rates of increase of net production were still assigned to light industry and chemistry. In the plan for 1986, the industrial branch of "electrical engineering and electronics" has the highest priority, next to "construction of machine tools and processing machinery". From this, one may conclude that the consideration of microelectronics as a key technology of strategic rank, which was begun at the Fourth Session of the Central Committee of the SED in December 1976, now is to be more emphatically converted into actual practice. Economically, the GDR has a good starting situation. In the area of hardware, it lags only two years behind world market developments. Software will present a greater problem, where they have kept up less well. The social-science research on the consequences of technology seems to be in great difficulties, if one wants to follow the published literature. The three texts presented here can serve as a joint example of this, although they approach the topic of "microelectronics" from respectively different angles.

The booklet by Dubrau/Netzschwitz involves a copiously illustrated, popular presentation of mainly technical changes which are associated with the introduction of microelectronics. These involve in particular information processing, computer technology, flexible automation, industrial robots, artificial intelligence, microelectronics at work and in everyday life. The

study by Hütter/Jobst, on the other hand, appears to direct itself towards a smaller public with specific questions (also judging by the price). It accents world perspectives and ideology. An analysis of microelectronics as a challenge for engineering and social sciences follows a lengthy explanation of the "main chain-link of microelectronics" in the framework of the scientific/technical revolution. In the third section, microelectronics is treated as a problem of the "engineering personality". Finally, the book by Marschall/Steinitz appears both specialized and popularized. The authors concentrate on the effects of microelectronics on economic "efficiency" (page 136 and elsewhere - the term "rationalization" remains associated with capitalism). With all three books, it is noticeable that the idea of a "value-free technology" is indeed rejected; but on the other hand, an understanding of technology dominates which can scarcely be designated otherwise than"naively instrumental". Technology becomes the subject of social-cultural processes, and in particular a revolutionary subject.

With Hütter/Jobst, microelectronics "revolutionizes" not only technical means, but also extensively influences the content of work, learning processes, modes of thinking, mass communication, "and many other areas" (page 5). If one would like to know how this extraordinarily potent technology is now stamped by the social system, one learns: "There exists no capitalist or socialist microelectronics". (Marschall/Steinitz, page 27; compare Dubrau/Netzschwitz, page 14). There is no consideration to what extent the origin of a technology from certain social-economic circumstances (key words: profit-orientation, armament requirements, manipulation industries) could also stamp their character itself. Instead of this, uniform scientific-technical and technological laws and principles are assumed. On this common technical basis, there exist no differences between capitalists and real-socialist microelectronics. In the view of all the authors, the differences appear only later. Indeed there exists differing and even opposite objectives, propelling forces, and social consequences for development and application. In capitalism, microelectronics serves armament, job-loss, supervision and manipulation, while in real socialism, microelectronics is used to satisfy needs and to enhance personality.

Correspondingly boorish is also the polemic against Western authors in the two books which appear from the Dietz Verlag. "Furien des Fortschritts" (Furies of progress) (Dubrau/Netzschwitz, page 142) must see "bürgerliche Sozialwissenschaftler" (bourgeois social scientists) (here the journalist Dieter Balkhausen) in the microchips, because they do not recognize that it is "the monopolies" who use new technical capabilities without scruple. Marschall/Steinitz also argue purely instrumentalistically agains imperialist "applications". Like Dubrau/Netzschwitz, they here often base themselves on a work "Microelectronics in the service of imperialism" (1) produced by a collective under the leadership of Emil Rechtziegler. More differentiated

(1) Compare authors collective under the leadership of Emil Rechtziegler: Microelectronics in the service of imperialism. Trends - Risks - Contradictions. Dietz Verlag, Berlin (East) 1982 (Review in Deutschland Archiv Issue No 2/1984, page 208ff).

are the critical models of Hütter/Jobst. Besides the Marxist-Leninist analysis from the DKP (German Communist Party) environment, they distinguish four more critical modes of discussion for technical progress. These are, first, a humanistic-utopian perspective, secondly a labor-participatory position, thirdly the assumption of complete implantation of society nology, and fourthly total pessimism. The first direction is assigned to the "club of Rome", the second to Ulrich Briefs, the third to Mike Cooley and Otto Ullrich, while Joseph Weizenbaum and Norbert Müllert are cited for the fourth. The differentiation of critical positions which has thus been accomplished is then used to make very different evaluations. The analysis of the "club of Rome" is indeed accused of "utopian socialism", but at the same time it is attested to be "realistically and scientifically at a high level (Hütter/Jobst, page 41). Ulrich Briefs is likewise treated benignly, although unfortunately he, too, has not yet accepted real socialism "as the alternative to capitalism" (ibid., page 47). On the other hand, Weizenbaum and Müllert must suffer the accusation of one-sided and wrong conceptions because of their more comprehensive critique of the industrial system. They are included among the "confusion potential" (ibid, page 50).

If the thesis is to be convincing, that there is no intimate relation between microelectronics and society, that the point is not a critique of the industrial system, but only its purposeful application - then the suspense is great how real socialism now tames the above-mentioned "furies of progress". On this point, the statements in all three books are pale. "Not all questions can even now be answered with adequate certainty" (Dubrau/Netzschwitz, page 156). There is indeed unanimity concerning the importance of the phenomenon. According to Marschall/Steinitz, "a new technical type" is developing and a "new quality of automation". For Hütter/Jobst, it is a "new stage of the scientific-technical revolution" and Dubrau/Netzschwitz observe "a qualitative revolution of productive forces". And the problems, the social consequences?

They are indeed mentioned but frequently in rather global fashion and as an aside. Thus, following a lengthy explanation of the impending microelectronic changes in the GDR industry, it is stated that "altogether a declining need for jobs can be expected" (Marschall/Steinitz, page 95). The introduction of "efficient man-machine systems" (ibid. page 76) presupposes a changed educational level. This results in the "difficult task, from the present known influences of microelectronics, which appear only as trends," to draw conclusions for the planning of the qualification structure (ibid. page 97). Primarily this surely means the creation of flexible education and further training. Hütter/Jobst are more specific in their information concerning consequent problems. Social loss of position, psychic stress, reduction of communicative relations, high fluctuation are cited as possible problems for engineers. "There certainly can be feelings of being at the mercy of this new work, of not being able to see through it, and being timid about it" (Hütter/Jobst, page 108). As consolation, one then reads: "Our employees ... are managing the upcoming requirements in the consciousness that they are thereby making a contribution to the all-round strengthening of the GDR. Is it not indeed so that we have already overcome more than half of the difficulties, as soon as we understand their meaning?" (Dubrau/Netzschwitz, page 155).

But precisely this is the open question. The texts reviewed here give witness of very few inhibitions relative to the massive introduction of microelectronics, despite sometimes nebulous ideas concerning its consequences. The rejection of "sorcerer's apprentice" effects even in real socialism precisely shows their weaknesses in detail. Consequently it appears very readily possible that the SED, with its strategic decision for microelectronics, has created future bundles of problems for itself which it can scarcely solve, if at all, without engineering scientists and management.

8348
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EAST EUROPE/MICROELECTRONICS

SHALLOW Zn DIFFUSION IN GaAs

Budapest FINOMMECHANIKA, MIKROTECHNIKA in Hungarian No 10-11, Oct-Nov 85
pp 312-314

BARTA, ERZSEBET, Dr, scientific worker, HOFFMANN, GYORGY, scientific worker, PFEIFER, JUDIT, Dr, chief of scientific department, PONOMARENKO, JURIJ, Mrs PUSPOKI, SANDOR, Dr, Mrs RADACSI, JANOS, scientific worker, and SOMOGYI, KAROLY, scientific worker, Technical Physics Research Institute of the MTA [Hungarian Academy of Sciences]

[Abstract] A well conducting contact layer has a critical influence on operation of optoelectronic GaAs devices such as LED's and injection lasers. The shallow diffusion of Zn is usually done in a closed system; diffusion in an unclosed space is simpler and faster but the thermodynamic conditions are more complicated. In the method described here the source is elementary Zinc and the temperature of diffusion is relatively low, less than 620 degrees Celsius. GaAs samples with various types of doping and orientation were used in the experiments. As a result of Zn diffusion a p-n junction develops in n type GaAs doped with Tellurium; these samples were covered with a CVD SiO2 layer 100 nm thick and etched with the traditional photolithographic method. Undoped n type layers 2 microns thick grown on a semiconductor GaAs carrier were used to determine the doping profile; p type GaAs layers were grown on a p+ GaAs carrier to prepare a sample to determine specific contact resistance and for infrared reflection experiments. The latter were doped with Germanium and then subjected to Zn diffusion. The diffusion experiments were done at various temperatures and for varying times in a vacuum in a closed quartz ampule and in flowing Hydrogen gas in a covered but not airtight chamber inside a graphite vessel. The Zinc source in the closed ampule version was a mixture of 5 percent Gallium, 50 percent Arsenic and 45 percent Zinc (atomic percentages); elementary Zinc was used in the graphite vessel. Cr-Au contact spots were prepared to measure the specific contact resistance. The Zn penetration profile was found to be even and reproducible. It was found that the traditional ampule diffusion resulted in a surface hole concentration of 5*1020 cm-3 while the Hydrogen flow (stream phase) diffusion done under various conditions resulted in a surface concentration of 3-6*1019 cm-3. In the opinion of the authors the latter figure is high enough for the Cr-Au contacts used to metal the p side of GaAs laser diodes to have good ohmic behavior.

FIGURE CAPTIONS

1. p 312. Sample to measure specific contact resistance on p type epitaxial GaAs layer.

2. p 312. Scanning electron microscope picture of the pn junction developed in GaAs as a result of Zn diffusion.

3. p 313. Study of Zn diffusion profiles with the differential van der Pauw method.

4. p 313. Infrared reflection (wavelengths and percentages) from the GaAs.

The five references are all to English language sources.

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EAST EUROPE/MICROELECTRONICS

VAPOR PHASE EPITAXIAL GROWTH OF GaAs STRUCTURES

Budapest FINOMMECHANIKA, MIKROTECHNIKA in Hungarian No 10-11, Oct-Nov 85 pp 315-317

GYURO, IMRE, scientific worker, GOROG, TAMAS, scientific group chief, SOMOGYI, KAROLY, scientific worker, and NEMCSICS, AKOS, scientific worker, Technical Physics Research Institute of the MTA [Hungarian Academy of Sciences]

[Abstract] Vapor phase epitaxial growth technology is widely used to grow layer structures for various purposes, for example microwave purposes. A system based on chloride transport is used at the authors' institute; Gunn, Schottky, varactor and MESFET layer structures have been grown successfully in it. AsCl3 is used as the As source, metallic Gallium is used as the Ga source and the carrying gas is H2, in a quartz reactor tube. To determine the optimum growth parameters for various types of layer structure experiments were devised to vary source temperature, deposition temperature and speed of gas flow in the H2 line, the AsCl3 line I and the AsCl3 line II. It was found that the growth speed has a maximum around 740 degrees Celsius, which separates two domains, a domain of kinetically limited growth at lower temperatures and a domain of growth limited by diffusion at higher temperatures. The charge carrier concentration decreases in a monotone way with increasing deposition temperature. The interdependence between growth speed and the value for gas flow in line I shows a maximum around 400 cubic cm per minute. The free carrier concentration changes to a greater degree at lower Hydrogen flow speeds while at higher flow speeds (4,000 cubic centimeters per minute) the change is relatively small. The degree to which growth speed decreases is greater at higher deposition temperatures. To test the reproducibility of the system a series of layer structures which could be used for Gunn diodes was grown. The planned parameters of the active layer were: thickness, 10 microns; free carrier concentration, 1*1015 cm-3. The values obtained were 10.14 microns plus or minus 1.18 microns and 1.23*1015 plus or minus 0.23*1015 cm-3. The authors conclude that these data can be used to determine optimal technological parameters for layer structures of various types and that the growth processes show great reliability, flexibility and reproducibility.

FIGURE CAPTIONS

1. p 315. Diagram of the vapor phase epitaxial growth equipment.

2. p 315. The temperature dependence of growth speed (a) and free carrier concentration (b). The parameters for the source temperature are: 815, 825, 835 and 845 degrees.

3. p 315. Dependence of growth speed (a) and free carrier concentration (b) on gas flow speed measured in the AsCl3 line I. The parameters for the gas flow speed measured in the Hydrogen line are 1,000, 2,000, 3,000 and 4,000 cubic centimeters per minute.

4. p 316. Dependence of growth speed (a) and free carrier concentration (b) on gas flow speed measured in the AsCl3 line II. The parameters for deposition temperature are 720 and 730 degrees Celsius.

5. p 316. Distribution of values for free carrier concentration (a) and layer thickness (b) for epitaxial layer structures grown for Gunn diodes.

6. p 316. Typical concentration profile of layer structures prepared for Gunn diodes.

7. p 317. Typical concentration profile of layer structures prepared for MESFET purposes.

Three of the four references are to English language sources; the fourth is to an unpublished work by K. Somogyi and I. Gyuro.

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EAST EUROPE/MICROELECTRONICS

DEVELOPMENT OF SEMICONDUCTOR LASER AT HUNGARIAN ACADEMY INSTITUTE

Budapest FINOMMECHANIKA, MIKROTECHNIKA in Hungarian No 10-11, Oct-Nov 85 pp 318-335

ANDOR, LASZLO, Dr, scientific worker, BARTA, ERZSEBET, Dr, scientific worker, Mrs CSONTOS, ZOLTAN, scientific worker, HOFFMANN, GYORGY, scientific worker, KOLTAI, FERENC, scientific worker, PFEIFER, JUDIT, Dr, chief of scientific department, PUSPOKI, SANDOR, Dr, scientific worker, Mrs KADACSI, JANOS, scientific worker, and SERENYI, MIKLOS, scientific worker, Technical Physics Research Institute of the MTA [Hungarian Academy of Sciences]

[Abstract] Semiconductor lasers can be used in optical fiber, xerographic and video disk applications. The Technical Physics Research Institute has been dealing with lasers since 1980. It already had experience in the area of luminescent materials and had liquid epitaxial layer growth equipment, developed there, for the laboratory production of illuminating diodes. The type of laser selected was the oxide isolated contact stripe laser. The basis for the choice was the available technology. The more important technical data for the laser diode developed by the Institute are:

Width of contact stripe	5-6 microns
Length of resonator	250-300 microns
Width of chip	350-400 microns
Thickness of oxide isolation	0.15-0.2 microns
Thickness of contact layer	1-1.5 microns
Thickness of p side holding layer	1-1.5 microns
Thickness of active layer	0.15-0.3 microns
Thickness of n side holding layer	1-2 microns
Thickness of carrier	80-100 microns

After a seven page discussion of the theory of lasers in general and of the parameters of semiconductor lasers in particular the article begins the discussion of the laser diode developments at the Technical Physics Research Institute with a review of the properties of the GaAs primary material, the liquid epitaxial production of heterojunctions, the creation of the oxide isolated contact stripe and the production and assembly of individual diodes. Many crystal growth experiments were done in the 650-700 degree Celsius range and a few in the 800-900 degree range. The equipment used consists of a high purity Hydrogen gas system, a graphite vessel or cassette, a quartz reactor

tube and a temperature controlled furnace with a programmable cooling speed. The piston cassette used has the advantage that the laser structure is constantly under a melt film from beginning to end of crystal growth and has no contact with the gas phase; the disadvantage is that the melts do mix somewhat in the piston chamber. Contact windows are etched by the photolithographic technique used in Silicon technology, but with added difficulties in the case of a GaAs device containing five epitaxial layers. The surface of the samples is one square centimeter or smaller and they are much more easily broken than Silicon. Zinc diffusion is used to reduce the contact resistance; a suitably high charge carrier concentration was achieved with diffusion in a quartz ampule at 650 degrees and in a graphite vessel in flowing Hydrogen gas at 580 degrees Celsius. A choice between the two methods will be made later by weighing the parameters, yield and life span of the diodes. Gold is the basic material for metalling the p side, with a Chromium layer between the oxide and the Gold. The chips finally produced were encapsulated by the Videoton enterprise. Figure 33 shows the curves for light output in mW and current strength in mA for samples 824/18 and 824/22; the measured threshold current strengths (approximately 130 mA) are in good agreement with the values calculated on the basis of geometric dimensions (156 mA). In conclusion, the threshold current for the laser diodes produced is 100-150 mA; the light output from one mirror sheet is approximately 3 mW with a wave length of approximately 0.85 microns, which means that the laser could be used in light telecommunications and in laser Xerography. The present development is concentrated on improving the still short life expectancy of the devices. Future plans include producing diodes with pigtails, switching to other materials (InP) and other designs (index conduction diodes).

FIGURE CAPTIONS

1. p 318. A few basic phenomena of the mutual effects of light and matter.

2. p 319. The band structure of direct (a) and indirect (b) forbidden band semiconductors.

3. p 320. Open direction band diagram of a homojunction laser diode.

4. p 320. Structure of broad area (a) and oxide isolated contact stripe (b) lasers.

5. p 321. Distribution of electric field and refraction index in the case of a thin wave guide in the direction perpendicular to the plane of the wave guide.

6. p 321. The light output-current characteristic of a laser diode.

7. p 321. Structure of an oxide isolated contact stripe laser and the lateral distribution of a few important quantities.

8. p 322. The active layer thickness dependence of the Gamma factor for various values of the Delta n parameter.

9. p 322. Cross section of an oxide isolated contact stripe laser.

10. p 323. Dependence of the current diffusion factor on width of the contact stripe; impulse operation threshold current density for contact stripe laser or broad area laser with the same layer structure.

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EAST EUROPE/SCIENTIFIC AND INDUSTRIAL POLICY

COOPERATION BETWEEN EAST GERMAN SCIENTIFIC, INDUSTRIAL SECTORS

East Berlin TRIBUENE in German No 71, 11 Apr 86 p 5

[Interview with Prof Dr Hans Fuchs, engineer, deputy director of the Central Institute for Cybernetics and Information Processes of the Academy of Sciences of the GDR and Dr. Horst Welzel, engineer, area director for development at the Center for Research and Technology of the Automation Plant Construction combine]

[Text] Hans Fuchs was born in 1937 in Reichenbach. After completion of his studies at the then existing College for Electrical Engineering (now TU) Ilmenau, he began his work as development engineer at the Institute for Control Engineering in Berlin in 1960. In 1972 Hans Fuchs received his doctorate at the Technical University Ilmenau. Later Dr Fuchs assumed the function of a department director. In 1979 he became director of the institute and, in 1981, also assumed the position of director for research and development of the combine VEB Elektro-Apparate-Werke (electrical equipment works) "Friedrich Ebert" Berlin-Treptow. In 1983 Dr Hans Fuchs became deputy director of the Central Institute for Cybernetics and Information Processes of the GDR Academy of Sciences. Since 1985 he has been in charge of cybernits research at the institute. In 1975 the Technical University Dresden appointed Dr Fuchs honorary lecturer and in 1983 honorary professor. In addition, he is a member of the central work group 'Control Engineering' at the Research Council of the GDR.

Horst Welzel was born in 1942 in Berlin. From 1960 to 1966, he studied high-frequency engineering at the Technical University Dresden. Subsequently, the new graduate began his professional work as a development engineer at the Institute for Electrical Facilities in Berlin. Horse Welzel worked as a group, division and area manager. In 1985 he was appointed area director for development at the Center for Research and Technology of the Automation Plant Construction combine. In 1981 he received his doctorate at the Institute for Automation in Kiev. Dr Welzel is a member of the board of the Scientific-Technical Society for Computer Science of the GDR. He is also a member of the central work group 'Control Engineering' at the Research Council of the GDR.

On January 15 of this year the news agency ADN reported the signing of the first coordination agreement by a Berlin industrial combine and the Academy

of Sciences of the GDR. The objective of this agreement is the fastest possible practical exploitation of new scientific-technical findings. The scientists and technicians have thus made a substantial contribution to the preparation of the 11th party congress of the SED. We questioned the "architects" of the agreement, Prof Dr Hans Fuchs of the Central Institute for Cybernetics and Information Processes of the Academy of Sciences and Dr Horst Welzel of the Center for Research and Technology of the Automation Plant Construction combine in detail about their initial experiences with the coordination agreement.

[Question] Is this agreement the first step towards cooperation between the Automation Plant Construction combine and the Academy of Sciences?

Dr Fuchs: A fine tradition of scientific-technical cooperation extending to several special areas exists between the academy and the Automation Plant Construction combine. This cooperation did not begin with the coordination agreement but was elevated as a result of it to a new quality level. The agreement also comprises more than just scientific-technical cooperation. I am thinking in this regard, among other things, of joint investments and the exchange of personnel. This new quality of closer cooperation binds the research collective of the academy tighter to the economic objectives of industry, thus conforming to the resolution adopted last year by the Council of Ministers.

Dr Welzel: The coordination agreement offers a satisfactory prerequisite for the realization of our constantly growing research tasks in accordance with the expanded production program. For one thing, the combine produces automation systems which control individual machine tools up to and including chemical plants and rolling mills. On another level, the production program extends from high-voltage test facilities to the large transformer. However, we also supply products which include safety systems for the railroad, light signal installations for road traffic, technical equipment for buildings, and medical equipment such as heart pacemakers. All of this ultimately yields the range of research tasks to be solved by the combine. Previously, cooperation with the academy existed only for the purpose of solving individual tasks. The coordination agreement now integrates all research more closely into the economic strategy of the combine.

[Question] Did the new agreement develop from existing cooperation or did the decisive impetus come only as a result of the resolution adopted by the Council of Ministers?

Dr Fuchs: The content is probably a logical conclusion of our earlier cooperation; its timing was, of course, determined by the resolution of the Council of Ministers. I am really quite proud of the agreement we worked out, since Erich Honecker said this about it at the conference of district delegates of the SED in Berlin: "The recently concluded agreement on research cooperation between the Automation Plant Construction combine and the Academy of Sciences can be called pathbreaking in many respects."

Dr Welzel: The technical progress is constantly accelerating. An example of this is microelectronics. The combine should utilize the research potential in the colleges and the academy to the fullest extent for the accomplishment of the tasks before us. During the past years we have worked out a complex automation system in which large technological processes, such as power plants or the drainage of strip mines, are monitored and controlled. This system, called "audatec," is of modular design, which means that its program of equipment may be adapted to any tasks. The academy is participating in its further development. By utilizing this research capacity, the system has been improved substantially in decisive parameters.

[Question] Why then was the cooperation raised to a higher level only at this time?

Dr Fuchs: First of all, the industrial combines have proven their value as an economic form of organization. They include the reproduction process from research and development through production all the way to the export stage. Secondly, both applied and basic research are becoming increasingly concrete subjects in the Academy of Sciences. In the economic strategy of our party, it is logical to involve science more fully in the reproduction process of the combines. At the start of a new five-year plan the time to take this step had come, in order to let its results become fully effective for the future.

[Question] Does the coordination agreement bind each institute of the academy to a certain combine?

Dr Fuchs: Yes, but this bond only applies to the specialty areas stipulated in the agreement. Thus, for instance, the Central Institute for Cybernetics and Information Processes cooperates with several combines. Our specialty fields extend from process automation through CAD/CAM solutions all the way to image processing systems of artificial intelligence or robot technology. Of course, each specialty field is bound to the corresponding combine. For this reason, coordination agreements are also concluded between the combines and the academy and not with individual institutes. In order to carry out its assignment, a combine may also conclude agreements with several institutes. The purpose of this coordination agreement is precisely to govern the cooperation of combines and academy with the most varied enterprises and institutes. This applies to specific, as well as application-oriented basic research all the way to applied research and rationalization projects.

Dr Welzel: Our combine is cooperating at the present time with the Central Institute for Cybernetics and Information Processes, the Central Institute for Nuclear Physics, the Central Institute for Electron Physics, and the Institute for Information and Computer Technology. The respective coordination agreement is supplemented by performance contracts relating to the tasks. These performance contracts are then binding for the respective institutes.

[Question] Are there already examples of the intensified cooperation?

Dr Fuchs: For the robot control system S 700 of the Automation Plant Construction combine we worked out sub-assemblies and mathematical formulations of process sequences, socalled algorithms. In addition, we produced programs for the linking of several control computers. In order to rationalize the projetions in plant construction to a greater degree, we optimized circuit diagrams for logical sequences of controls and automated the preparation of drawings for control systems.

Dr Welzel: The Central Institute for Nuclear Research assited us in the development of components for the automation of nuclear power plants. This institute also originated new diagnostic installations for the testing of materials important for us.

[Question] Is the academy's research effective in all areas of the combines' production?

Dr Fuchs: We have reached this goal to a great extent--insofar as this is possible for the Academy of Sciences, for we too are working in selected areas. These centers of research, like the most essential tasks of the combines, are determined by our social and economic strategy. To this extent an agreement was reached, of course, on the really important points. The coordination agreement should, however, help in smoothing out still existing inconsistencies in this respect.

[Question] What is now happening with the existing research lines of the academy which cannot be integrated into the economic strategy of the combines?

Dr Fuchs: Investigative basic research is not atall eliminated by such a practical orientation. If these tasks prove economically sustainable, they will also be financed from the national budget in the future. After all, institutes of the academy subordinate their capacities predominantly, but not completely, to the industrial combines.

[Question] What has happened in the area of personnel exchange and what tasks are posed in this regard in the near future?

Dr Welzel: In this area we are do doubt only at the beginning. Until now only some individuals were delegated to the corresponding institution. We, for instance, received scientists from the academy for the purpose of raising the scientific-technical level in the collectives, but also for the purpose of getting a firmer hold on the processes of directing research and development in the combine. To date, we have no experience in exchanging entire collectives. My idea of a first stage of exchanging larger groups is that we assign tasks to the academy which are top-notch from a scientific-technical point of view, thus offering the incentive to work in joint collectives, although on a different level. In the second stage one could combine the cooperating scientists into genuine collectives, giving each side a better insight into the work of its partner.

Dr Fuchs: The scientists from industry will be included in any event in the research work of the academy. They can thus improve their qualifications, possibly receive a doctorate, and then return to the combine or remain just as well at the academy. When research results are transferred to practical application, the process is reversed. Researchers of the academy will go along into industry and possibly remain there. New in the agreed-on exchange of personnel is that these are not delegated for a certain period, but that it will lead to permanent situations for some.

[Question] Is the majority of scientists really willing to change their jobs?

Dr Fuchs: We have no experience in this respect as yet. I, for instance, was still active in industry two years ago and have changed over to the academy, and this change is final for me. This is primarily probably a question of the field of work and the working environment. For personal reasons there has always been a turnover between academy and industry. According to the coordination agreement this change shall now be made purposefully and on schedule according to the research tasks to be solved. For this purpose, a lot of persuasion is undoubtedly necessary, for we will, of course, comply strictly with the Labor Code.

Dr Welzel: Such a well-focused personnel exchange can greatly accelerate the transition of a development to practical use. Dependent on the above is, among other things, whether we can introduce the new product on the market at the right time and thus have good chances for its export.

[Question] The further development of productive resources goes hand in hand with an ever-increasing division of labor. In this connection, is the exchange of personnel not a step back?

Dr Fuchs: The division of work in the academy is extensive. Not everyone is equally suited for all tasks within a research collective. Only the suitable scientists change over to the industrial partner. In my opinion, neither the coordination agreement nor the exchange of personnel changes the division of work between industry and combine. It is a mutual qualification process. This does not abolish the division of work but organizes it to make it more practical and changes the areas of responsibility somewhat. Thus, the director of a combine now must also assume greater responsbility for basic research and deal with it for a longer period, since plans are usually worked out in industry.

[Question] How is the financial cooperation worked out in the coordination agreement?

Dr Fuchs: To date we have had only two types of agreement. In one of them the industry paid for the research assignment, while the other involved orders from enterprises, whereby the services rendered were financed from the state budget. The combines only had the responsibility of certifying the exploitability and accuracy of the results. The latter agreements are no longer in existence. Every service contract concluded must be financed by industry. This also creates a greater obligation to actually make use of the results.

Dr Welzel: The academy must now invest the resources made available by us in such a manner that they result in the greatest possible gain for industry. This results in more concrete research and the achievements can be measured exactly from the specifications. The service contracts simultaneously offer the possibility of stimulating the quality of academy research by bonuses. The prerequisite, is, of course, the overfulfillment of the tasks established in the specifications. In addition, industry supports the academy in equipping joint colleges of technology and laboratories with research engineering and installations.

The interview with Dr Hans Fuchs and Dr Horst Welzel was conducted by Thomas Conrad.

PHOTO CAPTIONS

1. p 5. This d.c. voltage generator of the Automation Plant Construction combine permits the testing of components for high-voltage d.c. transmission systems. These tests are indispensible for the development of such transmission systems.

2. p 5. Coupling test between an 8-bit microcomputer and a 16-bit microcomputer at the Central Institute for Cybernetics and Information Processes of the Academy of Sciences of the GDR. Such experiments are a prerequisite for a larger computer network.

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